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THE
PAN-PACIFIC ENTOMOLOGIST

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San Francisco, California
1951

THE PAN-PACIFIC ENTOMOLOGIST

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The Pan-Pacific Entomologist

Vol. XXVII, No. 3 July, 1951

THE HISTORY OF THE PACIFIC COAST ENTOMOLOGICAL SOCIETY[1]

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Founding and Early History

The first entomologists to visit California were those connected with the Russian expeditions and settlements: Johann Eschscholtz, Eduard L. Blaschke, and Ilya Gavrilovich Vosnesensky. During the pioneer period they were followed by Pierre Joseph Michel Lorquin, Dr. Hans Herman Behr, Henry Edwards and James Behrens, and soon after a host of others so that by the beginning of the twentieth century there were quite a number of entomologists in southern California and a larger number centered about San Francisco.

When Carl or Charles Fuchs came to San Francisco in 1884, his enthusiasm acted as a magnet to draw most of the local entomologists together, and his workshop on Kearny Street was the usual meeting place for most local and visiting entomologists. To still further unite the entomologists, Mr. Fuchs issued a call for a meeting, on August 7, 1901, to organize the California Entomological Club.

[1]Based on contributions by E. O. Essig, P. D. Hurd, Jr., D. D. Jensen, H. B. Leech, E. G. Linsley, J. W. MacSwain, R. C. Miller, R. L. Usinger, and E. C. Van Dyke. The Society was founded 50 years ago, on August 15, 1901.

The first meeting convened at the California Academy of Sciences, on Market Street between Fourth and Fifth Streets, August 15, 1901. Mr. H. C. Fall acted as temporary president. The first Constitution and By-Laws of the Society were formulated and accepted at this meeting (Proceedings of the Pacific Coast Entomological Society, pp. 1-2). The following officers were elected: Charles Fuchs, President; Prof. Vernon Kellogg, Vice-President; Dr. F. E. Blaisdell, Secretary and Treasurer.

The following became Charter Members: Charles Fuchs, Edwin C. Van Dyke, Henry C. Fall, L. E. Ricksecker, H. H. Behr, W. G. W. Harford, Beverly Letcher, F. W. Nunenmacher, Wm. Ashmead, Edward M. Ehrhorn, James E. Cottle, F. E. Blaisdell, J. G. Grundel, C. A. Whiting, Newton B. Pierce, C. W. Herr, Geo. W. Harney, F. C. Clark, J. J. Rivers, L. O. Howard, Vernon Kellogg, L. Durstein, Alexander Craw, and the Grattum Naturalists Club of El Dorado, California, Sarah E. Harris, Secretary.

Some of the above, being but casually interested in the subject, soon dropped out. The majority, however, remained members as long as they lived. James E. Cottle, of Hayward, Calif., and E. C. Van Dyke are the only ones still living.

The name of the Society was changed at the fifth regular meeting on August 16, 1902, to the Pacific Coast Entomological Society, at the suggestion of Professor Trevor Kinkaid, who felt that it should not be kept a local society. As time went on, most of those who were interested in the subject of entomology on the Pacific Coast became members. The Society thus greatly extended its membership, including as it did those persons affiliated with the California Academy of Sciences, the University of California, Stanford University, the State Department of Agriculture and all local entomological agencies as well as the independent collectors and amateurs. Meetings were held at more or less regular intervals and, while Mr. Fuchs was President, generally at a German restaurant, where the formal meeting followed a social dinner. Later on they were held wherever quarters could be found, such as the private homes of the members.

At the time of the earthquake and fire, April 18, 1906, a considerable dislocation of the affairs of the members and Society took place. The main entomological collection of the California Academy was destroyed, only the types of the Lower California species from two expeditions being saved through the efforts of the botanist, Miss Alice Eastwood. The large and valuable Lepidoptera collec-

tion of Dr. Behr, which contained many types, was also completely destroyed. Of private collections, that of Mr. Fuchs which was at his quarters, 212 Kearney Street, was destroyed with the exception of a few boxes of his general collection which he personally carried to a place of safety. The Letcher and Cottle collections of Lepidoptera were also entirely destroyed. The Blaisdell collection, which was beyond the fire limits, suffered somewhat from the overturning of a couple of cases, while the Van Dyke collection, which was also beyond the fire limits, escaped. The Society records were in Dr. Blaisdell's possession, so were saved. Of out-of-town collections,

Fig. 1. Three charter members of the Pacific Coast Entomological Society. Left to right—F. E. Blaisdell, Sr., Chas. Fuchs, Beverly Letcher.

Ricksecker's suffered most. Mr. Ricksecker was at the time county surveyor of Sonoma County and his collection was stored at his offices in the court house at Santa Rosa; it was destroyed when that building was wrecked by the earthquake. Albert Koebele's collection was at his home in Alameda and remained uninjured; it contained, besides his own, the old Hartford collection and some material collected by O. T. Baron. Later the Harford collection was sold to Mr. W. M. Giffard and was made a part of that of the Hawaiian Sugar Planters' Experiment Station, and in 1926 Mr. Koebele's own collection was presented to the California Academy of Sciences by his widow. Mr. J. J. Rivers at the time of the earthquake was living in Santa Monica and his collection was with him and of course saved. Later on, this was sold to Dr. Walther Horn of Berlin.

As soon as possible after the fire the entomologists again assembled, and continued with their entomological work, rebuilding their collections where destroyed and keeping alive the Society. Four months after the fire, the 21st meeting of the Society was held on the evening of August 25, 1906, at the residence of Miss Julia Wright, 2329 Pacific Avenue, Alameda. From this time on entomological interest not only continued but increased. The Academy's expedition to the Galapagos Islands was away at the time of the fire, but returned before the year was out, and Mr. F. X. Williams, the entomologist, was able to report upon the collections made.

Relation to the California Academy of Sciences

In the years immediately following the earthquake and fire the Society was entirely on its own. Meetings were held at the homes of its members or at some hotel or restaurant following a dinner. A few meetings were held at the Academy's temporary headquarters, 343 Sansome Street, in 1914 and 1915, and then for several years in the Board Room of the Mechanics' Institute at 57 Post Street. From 1924 to 1932 the State Department of Agriculture's office, Room 10 in the Ferry Building, served as a meeting place.

When the "West Wing" of the Academy's new housing in Golden Gate Park was opened in 1916, Society members began making donations to the collections and affiliating with the Academy, but it was not until the *Pan-Pacific Entomologist* was started in 1924 that the present close relations began. Space was given for records, magazines, etc., and a certain amount of typing was donated to the Society. In return, the *Pan-Pacific* advertised Academy publications.

The "East Wing" of the Academy was completed and the Department of Entomology took possession of its present quarters in the winter of 1931-1932. It was soon considered advisable to hold the Society's meetings in these rooms and the first was held there March 4, 1933. This was an excellent move and has been to the advantage of both parties. It has given a permanent meeting room to the Society and a place for the members to deposit their collections where they are available for study at all times. And to the Academy it has supplied many workers who have made the entomological department one of the most active in the institution, and its insect collection one of the finest in America, in the short space of 35 years.

Affiliations

At the 75th meeting of the Society, March 20, 1920, the members voted in favor of affiliating with the Pacific Division of the American Association for the Advancement of Science. The Pacific Division held its fourth Annual Meeting in Seattle, June 17-19, 1920, and the committee to consider acceptance of society affiliations met on June 17. At that time our Society became officially affiliated, or, as it was later termed upon revision of the constitution of the A.A.A.S., "associated".

Fig. 2. The first Field Day, held near Niles, Alameda County, California, May, 1902. Standing, left to right—J. C. Huguenin, J. E. Cottle, B. Letcher, C. Fuchs, E. M. Ehrhorn. Seated—F. W. Nunenmacher, L. E. Ricksecker, Walther Horn (Berlin), F. E. Blaisdell, Sr., F. X. Williams.—Photo loaned by E. C. Van Dyke.

A special meeting of the Pacific Coast Entomological Society was held in conjunction with that of the Pacific Division on June 18, 1920, with President E. C. Van Dyke in the chair; Mr. E. P. Van Duzee, Secretary *pro tempore*, and Professor Kincaid acting as local representative.

At the fifth Annual Meeting of the Pacific Division, A.A.A.S., in San Francisco, our Society was on the official program, and met in the auditorium of the California Academy of Sciences on August 6, 1921, President Van Dyke in the chair.

Because so many members of the Society are in the field during the summer months, the relationship with the Pacific Division of the A.A.A.S., which meets in the summer, has never been close. However, the 91st meeting was held with the Association on Sept. 11, 1923, at the University of Southern California, Los Angeles.

A summer meeting was held on June 19, 1934, in conjunction with the Entomological Society of America, the American Association of Economic Entomologists and the Lorquin Entomological Club at the University of California, Berkeley.

The Society was officially listed as a participant at the Fifth International Congress of Entomology, Paris (1932) (E. C. Van Dyke, delegate); at the Eighth International Congress of Entomology, Stockholm (1948) (R. L. Usinger, delegate); at the Thirteenth International Congress of Zoology, Paris (1948) (R. L. Usinger, delegate); and was represented by three of its members, E. C. Van Dyke, E. P. Van Duzee, and W. B. Herms, at the Fourth International Congress of Entomology, Ithaca (1928), and by S. B. Freeborn at the Eleventh International Congress of Zoology, Padua, 1930.

Incorporation

In 1940, due to the increased financial responsibilities of the Society, including administration of the Henry Clinton Fall Publication Fund, it seemed advisable to incorporate under the laws of the State of California. The Society was incorporated on September 11, 1940. The Articles of Incorporation, together with the By-Laws adopted at that time, were published in the Pan-Pacific Entomologist, vol. 18, No. 1, pp. 31-37 (1942). The corporation was formed "to promote, sponsor, foster and stimulate research in the field of entomology; to provide facilities and opportunities for research and analysis of any and all phases of entomology by lectures, forums, discussions, experiments, surveys, public meetings, exhibitions, courses, classes, conferences, symposia and analyses; to publish books, pamphlets, monographs and in general to disseminate information about entomology and the results of entomological research; to accumulate and record historical facts and materials relating to entomology in general; to give, grant and sponsor the granting of fellowships and awards for study or research in the field of entomology; and in general, to act as a medium for the exchange of information and knowledge and research in entomology between the members of this corporation and scientists and entomologists throughout the world."

Meetings

By custom, an annual field meeting has been held by the Society since its founding. The first Field Day was held in the vicinity of

Irvington and Niles, Alameda County, in May, 1902. The list of participants includes names well known in entomology during the past half cenury: Edw. Ehrhorn, Chas. Fuchs, James Cottle, Beverly Letcher, F. W. Nunenmacher, F. C. Clark, L. E. Ricksecker, J. C. Huguenin, F. E. Blaisdell, F. X. Williams, and Dr. Walther Horn of Berlin.

In spite of the uncertainties of spring weather, the annual field trip has remained as a highlight of the year's activities, though in recent years emphasis has shifted more to the social than to the scientific side. This is perhaps attributable to the fact that areas near enough to be conveniently accessible are now comparatively well known entomologically.

Fig. 3. Field Day at Fairfax, Marin County, California, June 11, 1905. Left side, from the rear forward and from left to right—F. W. Nunenmacher, Von Geldern, J. C. Huguenin, J. E. Cottle (in cap), F. X. Williams, F. E. Blaisdell, Sr., C. Fuchs, F. E Blaisdell, Jr. At the table—Mrs. C. Fuchs. Right side—E. C. Van Dyke, Mrs. J. E. Cottle, Miss Julia Wright, Miss Bessie Wright, Miss Mary Moser, Mrs. Anna Blaisdell, Mrs. F. E. Blaisdell, Sr., Mrs. J. C. Huguenin.—Photo loaned by E. C. Van Dyke.

It has also become traditional to devote the first meeting of the fall to reports by members of their summer collecting experiences. These reports provide a vast fund of information as to collecting conditions throughout the Western United States in years past. These and the observations reported by members at regular meetings are a major contribution of our entomological society.

In recent years still another of the meetings has been set aside for a special purpose. The December meeting is now referred to as the annual business meeting and is the occasion for election of officers and for delivery of an address by the retiring president.

Committees

The four standing committees of the Society are Program, Membership, Publication and Historical. The work of the Program Committee speaks for itself on every page of the Proceedings. Membership and Publications are discussed elsewhere in this account.

A special Nomenclature Committee represents us in matters of zoological nomenclature. Early in World War II, at the request of the Society, the Nomenclature Committee (*Pan-Pacific Ent.* 18 (1) :43-45, 1942) drafted a proposal for a "Committee on Entomological Nomenclature". This timely move promoted the formation of the joint committee on scientific nomenclature in entomology at the meetings of the Entomological Society of America and the American Association of Economic Entomologists in San Francisco, December, 1941 (*Pan-Pacific Ent.* 18(3) :144, 1942).

The Historical Committee has been concerned chiefly with the accumulation and preservation of historical materials. These include 1) minutes and records of the Society, 2) correspondence, field notes, and newspaper clippings, and 3) photographs. Although these materials are the property of the Society, there is a close liaison with the entomological department of the California Academy of Sciences, where the materials are stored in a steel filing case. In addition to Society records the historical file contains a general accumulation of historical material for the western United States, especially in relation to entomologists and the collections that they have presented to the Academy.

The minutes of the Society's meetings are in several books. In addition there are hand-written and mimeographed programs of meetings, and reports on them, the basis for the published Pro-

ceedings. All these show clearly our debt to the late F. E. Blaisdell, Sr., for 27 years the Secretary.

The old letters include many from W. H. Edwards to W. G. Wright; Albert Koebele's correspondence, much of it from C. V. Riley and L. O. Howard; parts of the correspondence of J. J. Rivers, A. Fenyes, E. P. Van Duzee, F. W. Nunenmacher, and F. E. Blaisdell; a valuable file from L. I. Hewes, largely referring to his collection of Lepidoptera now at the Academy; letters and manuscript notes by Isabel McCracken; and the entomological correspondence of Ralph Hopping, fairly complete for a period of over 40 years, relating to his collection of Coleoptera which is also in the Academy. Lastly there is a bound, mounted collection of letters written by E. O. Essig to A. E. Michelbacher, during the former's European trip, 1936-1937.

There are valuable books of field notes, insect life-histories, and records of travel, the work of Albert Koebele, F. X. Williams, E. P. Van Duzee and Thomas Craig. These volumes contain much unpublished data. Most of the newspaper clippings came from Koebele, but some are of recent date.

The photographs include pictures of members of our Society, other western students, entomologists from various parts of the world (chiefly in the Koebele material), and an album of pictures taken abroad by C. L. Fox. Fortunately a majority of the photographs are identified.

The Proceedings

The Society first considered reproducing its Proceedings as early as the fifth meeting, August 16, 1902, at which time F. E. Blaisdell proposed that a mimeograph machine be purchased for this purpose. No action on this matter is recorded in the minutes, but the old mimeographing machine which he later used to produce notices and reports of the meetings, is still extant.

At the thirty-eighth meeting, December 3, 1910, "it was voted to raise the dues to $1.00 a year in order to accumulate funds for publishing the Proceedings of the Society at the end of each year."

The first record of a "Committee on Publication" appears on page 1 of the Proceedings with Frank E. Blaisdell, *Editor*, Edwin C. Van Dyke, and Creighton Wellman. The only mention of this committee in minutes of the meetings is at the sixty-fifth meeting, September 1, 1917 when L. R. Reynolds was appointed "in place of Dr. Creighton Wellman, who has been absent for several years."

The Proceedings of the first to 47th meetings of the Pacific Coast Entomological Society (called the California Entomological Club for meetings 1-5) were published in abstract form in the section "Doings of Societies," in the journal *Entomological News*. These appeared as follows: First meeting, *Ent. News*, 12:243, Oct., 1901; second, 13:31-32, Jan., 1902; third, 13:199-202, June, 1902; fourth, 13:265, Oct., 1902; fifth, 13:333-334, Dec., 1902; sixth, 14:59-60, Feb., 1903; seventh, 14:165-166, May, 1903; eighth, 14:276, Oct., 1903; ninth, 15:43-44, Jan., 1904; tenth, 15:107-108, Mar., 1904; eleventh, 15:223-224, June, 1904; twelfth, no meeting; thirteenth, 15:348-349, Dec., 1904; fourteenth, 16:95-96, Mar., 1905; fifteenth to seventeenth, 17:104-106, Mar., 1906; eighteenth and nineteenth, 17:226-227, June, 1906; twentieth and twenty-first, not published; twenty-second and twenty-third, 18:259-260, June, 1907; twenty-fourth and twenty-fifth, no meetings; twenty-sixth to twenty-eighth, 19:499-500, Dec., 1908; twenty-ninth to thirty-first, 20:330-332, July, 1909; thirty-second, no meeting; thirty-third to thirty-fifth, 21:431-433, Nov., 1910; thirty-sixth, not published; thirty-seventh to thirty-ninth, 23:89-91, Jan. 31, 1912; fortieth, not held; forty-first to forty-fourth, 24:38-42, Dec. 31, 1912; forty-fifth to forty-seventh, 25:380-383, Sept. 30, 1914; forty-eighth, not held.

No record was kept of the dates of publication of the early numbers of the Proceedings (F. E. Blaisdell, personal communication, several years prior to his death). We can only say that between February 25, 1911 (the last meeting date of the first of the annual, unnumbered parts) and February 14, 1921 (the date of receipt of copies in the Library of The American Entomological Society, *fide* Mrs. Venia T. Phillips, *in litt.*, 1951) the first two parts of volume 1 (pp. 1-30) and the Proceedings of the 37th to 76th meetings were published. Since publication of abstracts continued in *Entomological News* through October 1914, it might be that publication by the Society was delayed that long. In any event, starting with the thirty-seventh meeting, August 20, 1910, Proceedings were published as separate, unnumbered parts with pages also unnumbered, each part starting with the first meeting in the Fall and ending with the last meeting in the Spring (usually the field meeting). The years 1910 to 1920 were covered in this way, and publication dates can only be assumed to have been after the date of the last meeting reported in each part.

Fig. 4. Field Day at Muir Woods, Marin County, California, May 17, 1908. Standing, left to right—J. C. Huguenin, G. R. Pilate, W. Topp, C. Fuchs, (unidentified), Mrs. Fuchs, Mrs. A. Blaisdell, L. Munier ?, P. Baumberger, F. X. Williams. Seated, left to right—E. C. Van Dyke, Mrs. F. E. Blaisdell, (unidentified), F. E. Blaisdell, Jr., J. G. Grundel (kneeling), Mrs. Huguenin, F. E. Blaisdell, Sr., E. T. Cresson, Jr.—Photo loaned by F. X. Williams.

The first to thirty-sixth meetings present a separate problem. These Proceedings were presumably published after the start of the above-mentioned unnumbered series, since the pages are numbered consecutively from 1 to 77. The separate parts are not numbered but are stapled as follows: pp. 1-16, 17-29, 31-44, 47-76, 77. Assuming that these were published in order, they all must have appeared after March 1, 1911 (see footnote, p. 3). Pages 1 to 30 were received at the Library of the American Entomological Society on February 14, 1921, and pages 31-46 on Feb. 19, 1924, 47-76 on Sept. 26, 1924, and page 77 on Aug. 8, 1927. The latter were not listed in Catalogue 12 published by John D. Sherman, Jr., in May, 1922, but (excepting p. 77) were noted as "all published to date" in Catalogue 19, Nov. 1924 (*fide* John D. Sherman, Jr., *in litt.*, 1951). Pages 47 to 76 were printed in early September, 1924, and the signature was distributed at the 95th meeting on September 13 (see Vol. 2, No. 4, top of p. 48).

Volume 2 continued the annual parts, each part covering the academic rather than calendar year, from the eighty-first to the one hundred and twenty-first meetings, 1921 to 1930, 9 parts, 131 pages. Only two of these parts are dated (fortunately, the two parts which contain descriptions of new species). These are No. 1, pp. 1-14, Nov. 15, 1922, and No. 2, pp. 15-34, Jan. 31, 1924. Numbers 3 to 9 can only be assumed to have been published after the date of the last meeting mentioned.

Dates of receipt of the various parts discussed above at the Library of the American Entomological Society, Philadelphia, Pa., are indicated in Table 1. Members of the Pacific Coast Entomological Society and all those who have occasion to use its Proceedings are deeply indebted to the authorities of the American Entomological Society and the Academy of Natural Sciences of Philadelphia for the assistance in publishing its Proceedings rendered during the early days of our Society and, in later years, for the meticulous recording of dates of receipt of the publications of our Society. To Mrs. Venia T. Phillips, Librarian for both the Philadelphia Academy and the American Entomological Society, in particular, we are indebted for extracting the data listed in Table 1.

In addition to the data already mentioned, Mrs. Phillips writes, "We also have mimeographed copies of Proceedings of the meetings 27th to 29th, pages 1-10, and of meetings 30th to 31st, pages 1-7. On the top of the 30th to 31st Proceedings is a pencilled notation these minutes were reissued in printed form with slight alterations."

Starting with the 122nd meeting, the Proceedings were published in the Society's journal, the *Pan-Pacific Entomologist*, as follows: meetings 122-125, Pan-Pacific Ent. 8:185-190, Sept. 19, 1932; meetings 126-128, 10:45-47, Mar. 31, 1934; meetings 129-135, 11:185-189, Jan. 10, 1936; meetings 136-139, 13:141-144, Sept. 14, 1937; meetings 140-143, 14:46-48, Mar. 12, 1938; meetings 144-145, 14:191-192, Nov. 15, 1938.

From meeting 146 to date the Proceedings have appeared regularly on the last pages of the January issue of each year for the period covered by the preceding calendar year.

The Proceedings, as noted above, contain minutes of the meet-

ings. They also contain abstracts of papers presented at the meetings. Of more importance to bibliographers are the formal papers which were published, especially in the earlier numbers. These include, among others, Fenyes, A.—Aleocharinae from the Aleutian Islands (43rd meeting, April 20, 1912; 4 pp.); Fall, H. C.—New species of Coleoptera from Humboldt County, California (Vol. 2, No. 1, pp. 12-14; Nov. 15, 1922); Van Duzee, E. P.—A new ceratocombid from Mexico (Vol. 2, No. 2, pp. 33-34; Jan. 31, 1924); Spencer, G. J.—An ear-wig new to British Columbia (Vol. 2, No. 4, pp. 65-66, read at the 99th meeting, June 17, 1925); Van Dyke, E. C.—Secondary sexual characters of the Coleoptera (Vol. 2, No. 5, pp. 75-84, read at the 102nd meeting, Dec. 12, 1925).

TABLE 1

DATES OF RECEIPT OF PARTS OF THE PROCEEDINGS OF THE PACIFIC COAST ENTOMOLOGICAL SOCIETY AT THE LIBRARY OF THE AMERICAN ENTOMOLOGICAL SOCIETY, PHILADELPHIA, PENNSYLVANIA

Part	*Meetings*	*Pages*	*Date*
(Vol. 1, No. 1)	1st to 12th	1 - 16	Feb. 14, 1921
(No. 2)	13th to 16th	17 - 30	Feb. 14, 1921
(No. 3)	17th to 20th	31 - 46	Feb. 19, 1924
(No. 4)	21st to 35th	47 - 76	Sept. 26, 1924
(No. 5)	36th	77	Aug. 8, 1927
(No. 6)	37th to 40th	8 unnumbered	Feb. 14, 1921
(No. 7)	41st to 44th	12 "	Feb. 14, 1921
(No. 8)	45th to 48th	7 "	Feb. 14, 1921
(No. 9)	49th to 52nd	7 "	Feb. 14, 1921
(No. 10)	53rd to 56th	1 - 12	Feb. 14, 1921
(No. 11)	57th to 60th	7 unnumbered	Feb. 14, 1921
(No. 12)	61st to 64th	11 "	Feb. 14, 1921
(No. 13)	65th to 68th	8 "	Feb. 14, 1921
(No. 14)	69th to 72nd	6 "	Feb. 14, 1921
(No. 15)	73rd to 76th	11 "	Feb. 14, 1921
(No. 16)	77th to 80th	13 "	Dec. 7, 1922
Vol. 2, No. 1	81st to 85th	1 - 14	Dec. 7, 1922
No. 2	86th to 89th	15 - 34	Feb. 19, 1924
No. 3	90th to 94th	35 - 46	Mar. 14, 1925
No. 4	95th to 99th	47 - 66	June 16, 1926
No. 5	100 to 104	67 - 88	Apr. 8, 1927
No. 6	105 to 109	89 - 100	Mar. 2, 1928
No. 7	110 to 113	101 - 112	Feb. 15, 1929
No. 8	114 to 117	113 - 124	Jan. 31, 1930
No. 9	118 to 121	125 - 131	Feb. 6, 1931

The Pan-Pacific Entomologist

The first effort to provide a journal representative of the entomological work being done on the west coast was made by the Pacific Coast Entomological Society during the first world war (Proceedings, 66th meeting, December 15, 1917). The publication was to be called the Pacific Coast Entomologist, but had to be abandoned owing to the uncertain conditions prevailing at that time. Seven years later, on June 25, 1924, the Society issued the first number of its journal—*The Pan-Pacific Entomologist*, under the editorship of E. P. Van Duzee with E. C. Van Dyke as associate editor and F. E. Blaisdell as treasurer. The Publications Committee consisted of E. O. Essig, chairman, G. F. Ferris, E. C. Van Dyke, R. W. Doane, Grant Wallace, W. W. Henderson and J. C. Chamberlin.

Changes in the management of the journal in the course of the past quarter century were—Editor: E. P. Van Duzee, 1924-1939; R. L. Usinger, 1939-1943; E. G. Linsley, 1943-1946; R. L. Usinger and E. G. Linsley, co-editors, 1946-1950; P. D. Hurd, Jr., and H. B. Leech, co-editors, 1950--. Treasurer: F. E. Blaisdell, 1924-1926; S. B. Freeborn, 1926-1931, E. R. Leach, 1932-1942: R. C. Miller, 1943--.

From the start, the *Pan-Pacific Entomologist* though officially the organ of the Pacific Coast Entomological Society, was published in close cooperation with the California Academy of Sciences. This cooperation has included contributing the time of the editors during the early years of publication, the time of the treasurer in recent years, and such other tangibles as financial assistance, help in mailing, and storage. In return, the Academy has enjoyed the benefits of the cooperative effort, many papers based on Academy collections have been published in the *Pan-Pacific Entomologist* and, more often than not, types of new species described in the Journal have been deposited in the Academy's collection.

Other direct benefits to the Academy include the journals which the Society receives in exchange for the *Pan-Pacific Entomologist* and the books received for review by the editors. Twenty-three journals from 16 countries are received in exchange for the *Pan-Pacific Entomologist*. Since the Society does not maintain a library, all such exchanges are turned over to the library of the California Academy of Sciences and entomological items are placed on the

shelves in the Department of Entomology. The Society is thus saved the expense of housing, cataloging and looking after this literature, though it is readily available to both resident and visiting members. The Academy's library thus gains periodicals having a subscription value of some $75.00 a year.

The contributions to the *Pan-Pacific Entomologist* by the University of California, though less formal, have been consistent over the years. Direct assistance included the time of the treasurer, business manager, and the editors at various periods and secretarial assistance in connection with the above activities.

Of particular value to the journal during the recent period of rising costs has been the work of the advertising manager, A. E. Michelbacher. The mutually beneficial relationships between the Society and advertisers is especially appreciated by members and subscribers.

Now in its 27th volume, the *Pan-Pacific Entomologist* has published over 5,000 pages of original entomological work—mostly on insects of western North America and the Pacific Basin. Having passed the quarter-century mark, the journal can be said to have served well the purpose of its founders as "a regular entomological periodical which shall adequately represent the work being done in the west" and to have proved really worthy of its rather ambitious sounding title of *Pan-Pacific Entomologist.*

Henry Clinton Fall Memorial Publication Fund

The Henry Clinton Fall Memorial Publication Fund (Pan-Pacific Ent., 17(1):33, 1941) was established by the Society as the result of a gift of securities from Mrs. Carl A. Richmond, sister of the late Henry Clinton Fall (Pan-Pacific Ent. 16(1):1-3, 1940, Plate), distinguished Coleopterist and charter member of the Society. Under the terms of the gift, the fund is administered by the Board of Directors of the Society through the Publication Committee. Mrs. Richmond generously permitted the Society freedom of action both in the administration of the fund and the subject matter covered by the publications to which it is applied.

The Society has felt that this fund should form the nucleus of an endowment fund, the proceeds to be used for publication of monographs which are too long for the Pan-Pacific Entomologist. The first volume of the new "Memoirs" series is currently being published.

Officers, Members and Trends in Membership

The original articles of organization stated that the officers of the Society shall consist of a president, vice-president, secretary and treasurer and such committees as are deemed necessary. The names of the officers and the years of their service are listed below. Dr. E. C. Van Dyke was elected honorary president for the semi-centennial year, 1951.

OFFICERS

Years	*President*	*Vice-President*	*Secretary*	*Treasurer*
1901-1907	Charles Fuchs	Vernon Kellogg	F. E. Blaisdell	
1908-1927	E. C. Van Dyke	(Various)	F. E. Blaisdell	
1928-1931	E. C. Van Dyke	G. F. Ferris	J. O. Martin	
1932-1933	G. F. Ferris	E. O. Essig	J. O. Martin	
1934-1935	E. O. Essig	H. E. Burke	J. O. Martin	
1935-1936	E. O. Essig	C. D. Duncan	E. G. Linsley	
1937-1938	C. D. Duncan	R. L. Usinger	E. G. Linsley	
1939-1940	E. G. Linsley	H. M. Armitage	P. C. Ting	E. R. Leach
1941	E. O. Essig	H. M. Armitage	E. G. Linsley	E. R. Leach
1942	H. M. Armitage	H. H. Keifer	E. G. Linsley	E. R. Leach
1943	H. H. Keifer	M. A. Stewart	E. G. Linsley	R. C. Miller
1944	M. A. Stewart	F. P. Keen	E. G. Linsley	R. C. Miller
1945	F. P. Keen	C. D. Duncan	E. G. Linsley	R. C. Miller
1946	C. D. Duncan	E. G. Linsley	E. S. Ross	R. C. Miller
1947	E. L. Kessel	A. E. Michelbacher	E. S. Ross	R. C. Miller
1948	A. E. Michelbacher	E. S. Ross	D. D. Jensen	R. C. Miller
1949	E. S. Ross	G. F. Ferris	D. D. Jensen	R. C. Miller
1950	G. F. Ferris	R. L. Usinger	D. D. Jensen	R. C. Miller
1951	R. L. Usinger	E. O. Essig	D. D. Jensen	R. C. Miller

The first president, Charles Fuchs, served for seven years. He was followed by Dr. Edwin C. Van Dyke who was president for 23 consecutive years from 1908 through 1931. From 1932 to 1940 the presidents served for either two or three years and since that time the office has changed annually. The first secretary-treasurer, Dr. F. E. Blaisdell, served for 27 years.

The Society was organized in 1901 with 23 charter members. It is of interest that the majority of the charter members were not professionally engaged in entomology, but collected and studied insects in their spare tome for the pleasure they derived from their avocation. Only five, William Ashmead, Edward M. Ehrhorn, L. O. Howard, Vernon Kellogg and Alexander Craw, were professional entomologists. The others represented a variety of vocations and included several doctors.

In the intervening years the ratio of professionals to amateurs has changed until at the present time most of the members are either employed in entomology or are students preparing themselves for professional careers in entomology. Although the proportion of members whose activity in the field must be confined to their leisure hours has diminished, the amateurs continue to make

valuable contributions to the subject of entomology and to the program of the Society.

During the fifty years since its organization, 477 people have been elected to membership in the Society. Table 2 summarizes for each decade since 1901 the number of new members, the average number of meetings held a year and the average attendance a meeting. The list of active members in 1951 stands at 248.

TABLE 2

SUMMARY OF NEW MEMBERS, AVERAGE NUMBER OF MEETINGS HELD A YEAR AND AVERAGE ATTENDANCE A MEETING FOR EACH DECADE FROM 1901 THROUGH 1950

Time Period	New Members	Average Number Meetings a Year	Average Attendance a Meeting
1901 - 1910	66	3.3	17
1911 - 1920	33	3.8	17
1921 - 1930	54	4.5	20
1931 - 1940	106	4.0	26
1941 - 1950	203	5.1	35[1]

[1]Average attendance a meeting during 6 non-war years.....47
Average attendance a meeting during 4 war years.....16

Attendance at meetings has increased from an average of 17 during the first decade to an average of 35 during the 1941-1950 period. Moreover, for six years of the last decade attendance a meeting average 47. During the other four years the average was only 16 because so many members were in war service. The year 1948 saw the greatest numerical participation with 65 new members and an average attendance a meeting of 55 members and friends.

PACIFIC COAST ENTOMOLOGICAL SOCIETY

*Roster of Persons Who Hold or Have Held Membership**

'42 Aarons, Theodore
'50 Abram, Howard
'48 Adams, C. F.
'48 Adams, Don W.
'47 Adams, P. A.
'37 Aitken, Thomas G.
'05 Akins, Maggie
'44 Allen, Merlin W.
'45 Allen, Robert P.
'15 Ames, Mary
'29 Annand, P. W.
'49 Applegarth, A. G.
'38 Armitage, H. M.
'47 Arnaud, P. H.
Ch Ashmead, Wm.
'36 Atkins, Clifford H.

*Ch - Charter member (1901). LM - Life member. HM - Honored member. HonM - Honorary member. [Names in capital letters Honored or Honorary membership.] Footnotes refer to death notices (Notice) and obituaries (Obit.) published in the *Proceedings* of the Pacific Coast Entomological Society and in the *Pan-Pacific Entomologist*.

'49 Atkins, Ferne E.
'48 Augustson, G. F.
'47 Bacon, Oscar G.
'35 Bailey, S. F.
'48 Baker, James
'29 Baldwin, Paul H.
'48 Barber, H. G.
'48 Barber, Herbert S.
'40 Barnes, Martin M.
'40 Barr, W. F.
'27 Barret, R. E.
'39 Bartges, Rex
'37 Bartlett, B. R.
'20 Basinger, A. J.
'48 Bauman, Wilfred K.
'05 Baumberger, Percy
'48 Beal, R. S., Jr.
'42 Beer, Frank
'47 Beer, Robert E.
Ch Behr, H. H.
'48 Benedict, Stanley H.
'50 Bentinck, William C.
'48 Bequaert, J. C.
'01 Berger, L. E.
'29 Bertrand, J.
'47 Bixby, D. H.
'29 Blackwelder, Richard E.
'37 Blair, Millard F.
Ch BLAISDELL, F. E (HonM., '38)[1]
'47 Blakemore, Herbert
'47 Boddy, Dennis W.
'35 Bohart, George E.
'35 Bohart, Richard M.
'34 Boyce, Janet Mabry
'37 Boyer, L. Bryce
'07 Bradley, J. C.
'51 Braff, Edythe B.
'13 Breeze, William F.
'04 Bremner, O. E.
'40 Brereton, A. W.
'10 Bridwell, J. C.
'39 Brookman, Bernard
'24 Brosius, Fred C.
'48 Brown, F. Martin
'36 Brown, Phyllis
'25 BRUNER, LAWRENCE (HonM., '35)[2]
'47 Bryan, Douglas E.
'49 Bryant, Owen
'50 Brydon, Harold A.
'04 Burke, C. V.
'21 Burke, H. E.
'23 Cain, Brighton C.
'37 Cameron, Alan D.
'21 Campbell, Roy E.
'04 Carnes, E. K.
'48 Carter, G. F.
'48 Castillo, Roberto Levi
'35 Cazier, Mont A.
'20 Chamberlin, J. C.
'41 Chandler, Harry P.
'46 Chandler, La June Dunn
'03 Chapman, Bertha
'02 Chapman, Wm.
'41 Chong, Wing You (LM)
'40 Christensen, L. D.
Ch Clark, F. C.
'01 Clark, Mrs. F. C.
'36 Clark, John C.
'03 Clark, W. T.
'44 Cockerell, T. D. A.[3]
'48 Cody, L. R.
'19 Cole, Frank R.
'01 Coleman, George A.
'48 Coleman, Richard W.
'23 Comstock, John A.
'49 Cook, Ediom F.
'49 Cook, Thomas W.
'06 Coolidge, C. K.
'39 Cope, Oliver B.
'41 Cott, H. Edwin
Ch Cottle, James E.
'49 Coy, L. P.
Ch Craw, Alex.
'08 Cresson, E. T., Jr.
'46 Culver, B. Dwight
'26 Curry, John F.
'39 Dahl, R. G.
'48 Davidson, W. M.
'24 Davis, Alonso C.
'49 Davis, Donald W.

[1]BLAISDELL—Notice, P-P.E. 22(3) :99. 1946. Obit. 23(2) :49-58, pl. 1947.
[2]BRUNER—Notice, P-P.E. 13(1-2) :68. 1937.
[3]COCKERELL—Notice, P-P.E. 24(1) :8. 1948. Obit., 24(3) :117-121, pl. 1948.

'46 Davis, Edgar W.
'31 Davis, Theoron
'48 Day, W. C.
'35 Daybell, Elwyn
(see Dorman)
'44 Deaver, A. L.
'36 DeBach, Paul
'35 DeLeon, Donald
'46 Dethlefsen, E. S.
'20 De Vise, C. J.
'36 Dickson, R. C.
'19 Dietrich, Henry
'50 Dixon, Elbert B.
'24 Doane, R. W.[4]
'44 Donohoe, Heber C.
'35 Dorman, Elwyn Daybell
'29 Doudoroff, Michael
'47 Doutt, R. L.
'37 Downes, J. A.
'50 Downing, C. A.
'43 Drake, Carl J.
'48 Dreisbach, R. R.
'41 Driver, Fred J.
'37 DuBois, J. J.
'20 Duncan, Carl D.
'46 Duncan, Douglas K.
'47 Duncan, J. Bruce
'46 Dunn, La June
(see Chandler)
Ch Durstein, L.
'46 Eads, Clark O.
'02 EASTWOOD, ALICE
(HonM., '12)
'41 Eaton, C. B.
'48 Edwards, J. Gordon
'48 Ehrenford, Frank A.
Ch Ehrhorn, Edward M.[5]
'49 Elishewitz, Harold
'48 Elmer, Harold S.
'36 Elsea, James
'36 Embury, M. A.
'14 ESSIG, E. O. (HM, '48)
'47 Estabrook, L. A.[6]
Ch Fall, H. C.[7]
'36 Ferguson, George
'46 Ferguson, William E.
'19 FERRIS, G. F. (HM, '48)
'51 Figg-Hoblyn, John
'47 Fisher, T. W.
'41 Fleschner, Charles A.
'41 Flock, R. A.
'09 Fox, Carroll
'12 Fox, Charles L.[8]
'20 Frank, Arthur
'36 Fraser, Isabelle
'40 Frazier, N. W.
'25 Freeborn, Stanley B.
'34 Freitag, J. H.
'41 Frick, Kenneth E.
'48 Fritz, Roy F.
'46 Frizzell, Harriet E.
'36 Frost, Florence
Ch Fuchs, Charles[9]
'36 Furman, Deane P.
'33 Furniss, R. L.
'40 Furry, F. W.
'44 Galindo, Pedro
'17 Garnett, Richard T.
'46 Gentner, L. G.
'50 Gerhardt, P. D.
'48 Gillaspy, James E.
'46 Gillogly, Lorin R.
'37 Gisla, Benedict G.
'24 Gladstone, J. B.
'38 Good, N. E.
'48 Gould, Douglas J.
'49 Graf, Otto W., Jr.
'46 Grant, C. Donald
'25 Grant, U. S., IV
'48 Gratz, Norman G.
'15 Graves, John O.
'48 Green, J. W.
'48 Greenfield, Howard
'32 Gressitt, J. Linsley (LM)
'35 Grimmenstein, Edith-Mae
'03 Grinnell, Fordyce

[4]DOANE—Notice, Proc. in P-P.E. 19(1) :40. 1943.
[5]EHRHORN—Notice, P-P.E. 17 (2) :84. 1941.
[6]ESTABROOK—Notice, Proc. in P-P.B.S. 25 (1) :48. 1949.
[7]FALL—Obit., P-P.E. 16(1) :1-3, pl. 1940.
[8]FOX—Notice, P-P.E. 4(4) :192. 1928.
[9]FUCHS—Notices, Proc. vol. 1, 53rd meeting, p. 1; 55th meeting, p. 10. 1921. Vol. 2(4) :62. 1926.

Ch Grundel, J. G.[10]
'45 Guedet, Rev. Edward
'29 Gunder, J. D.
'46 Gustafson, Joel F.
'37 Hackley, R. E.
'24 Hadden, F. C. (LM)
'46 Hagen, Ellsworth
'39 Hagen, K. S.
'49 Hall, S. E.
'47 Hanson, C. H.
'46 Hardman, N. F.
Ch Harford, W. G. W.
Ch Harney, George W.
'48 Hart, John F.
'46 Hart, Winfield H.
'21 Hartman, R. D.
'35 Harvey, Paul A.
'46 Harville, John
'47 Hatch, M. H.
'36 Haut, Ferne
'47 Hazel, N. W.
'48 Hazeltine, William
'27 Heid, Graham
'49 Heimpel, A. M.
'24 Henderson, W. W.
'48 Henry, Laura M.
'35 Henry, Louise
'45 Herman, C. M.
'10 Herms, W. B.[11]
Ch Herr, C. W.
'30 Hewes, L. I.
'49 Hildebrand, C. W.
'16 Hill, C. A.
'48 Hill, Harry A.
'13 Hilton, William A.
'31 Hinton, Howard E.
'49 Hobbs, Kenneth R.
'01 Hopping, Ralph[12]
'50 Hottes, F. C.
Ch HOWARD, L. O.
(HonM., '12)
'34 Hovanitz, William
'48 Hoyt, C. P.
'49 Hoyt, William L.
'50 Hubert, Alexander A.
'01 Huguenin, J. C.[13]
'49 Hunt, R. W.
'03 Hunter, J. S.
'46 Hurd, Paul D., Jr.
'49 Innes, K. F.
'47 James, Maurice T.
'36 Jensen, Dilworth D.
'39 Johnson, John W.
'48 Johnson, Phyllis
'11 JOHNSTON, O. B.
(HonM., '11)
'42 Jones, E.
'34 Jones, E. W.
'44 Jones, Paul R.
'47 Jones, V. E.
'27 Keen, F. P.
'20 Keen, Sadie E.
'51 Keh, Benjamin
'25 Keifer, H. H.
'30 Kelley, D. G.
'40 Kelley, Thomas F.
Ch KELLOG, VERNON
(HonM., '12)
'48 Kelson, Walter E.
'05 Kerr, Mrs. E. L.
'36 Kessel, Mrs. E. L. (LM)
'36 Kessel, E. L. (LM)
'04 Killeen, John F.[14]
'20 Killeen, Louise Rupe
'20 Kincaid, Trevor
'41 King, Lawrence H.
'05 Knight, F. W.[15]
'48 Knowlton, George F.
'01 Koebele, Albert[16]
'40 Kolber, Marvin
'41 Lamiman, J. F.
'27 Lammertz, Walter E.
'08 Lange, W. H.
'33 Lange, W. H., Jr.

[10]GRUNDEL—Notice, P-P.E. 10(1):26. Obit., 10(1):48, pl. 1934.
[11]HERMS—Notice, P-P.E. 25(4):192. 1949.
[12]HOPPING—Obit., P-P.E. 18(1):1-3, pl. 1942.
[13]HUGUENIN—Notice, P-P.E. 3(3):152. 1927. Obit., Proc. P.C.E.S., 2(6):95-96. 1928.
[14]KILLEEN—Notice, Proc. in P-P.E. 14(4):192. 1938.
[15]KNIGHT—Proc. P.C.E.S., vol. 1, p. 36. 1924.
[16]KOEBELE—Notice, P-P.E. 1(4):191. 1925.
[17]LETCHER—Notice, Proc. P.C.E.S. vol. 1, p. 32. 1924.
[18]LIGHT—Notice, P-P.E. 23(3):144. 1947. Obit. 24(2):49-53. 1948.

'47 Lanham, U. N.
'21 Larson, A. O.
'47 Larson, A. W.
'20 Lathrop, F. H.
'51 Lauret, Thomas H.
'16 LEACH, E. R.
(LM), (HM., '48)
'46 Lee, Welton L.
'47 Leech, H. B.
'48 Leigh, Francis
'36 Lester, Will, Jr.
Ch Letcher, Beverly[17]
'48 Lewallen, Lawrence L.
'51 Lewis, Norman A.
'37 Light, S. F.[18]
'35 Lindahl, John C.
'49 Linsdale, Donald D.
'27 Linsley, E. Gorton
'21 Lovett, A. L.[19]
'29 McClay, A. T.
'51 McCluskey, Elwood S.
'20 McCracken, Isabel
'13 McGlashan, Ximena
'41 McKinstry, A. P.
'31 McKenzie, Howard L.
'40 MacLeod, G. F.
'51 McMillan, William E.
'49 MacNeil, C. Don
'40 MacSwain, J. W.
'34 Mabry, Janet
(see Boyce)
'43 Madsen, Harold
'37 Maehler, Kenneth L.
'48 Malkin, Borys
'35 Mallis, Arnold
'10 Mann, William
'41 Mansfield, George S.
'50 Marsh, Gordon
'47 Marquis, Manuel
'45 Martin, C. H.
'19 Martin, J. O.
'48 Matton, Rudolf H. T.
'16 Mautz, Wolfgang
'31 Mead, Albert R.
'20 Melander, A. L.
'41 Meyers, Ernest G.
'33 Michelbacher, A. E. (LM)
'36 Michener, Charles D.
'46 Middlekauff, W. W.
'38 Miller, Robert C. (LM)
'09 Mitzmain, Maurice B.
'42 Moorhead, Peter
'49 Morishita, Frank S.
'48 Morris, Eugene
'21 Morrow, A. W.
'48 Mote, Don C.
'04 Moulton, Dudley
'03 Munier, Leon E.
'47 Murray, W. D.
'48 Myers, Omar E.
'23 Nast, E. H. (LM)
'20 Newcomer, E. J.
Ch Nunenmacher, F. W.[20]
'47 Nutting, W. H.
'48 Osborn, Herbert
'02 Otis, Hamilton
'34 Parker, Frank H.
'44 Parsell, Charles, Jr.
'41 Pearce, Wallace M.
'36 Pedrotti, P. W.
'37 Pelle, Walter V.
'29 Peterson, Charles E.
'46 Piazza, Salvador R.
Ch Pierce, Newton B.
'21 Pierce, W. D.
'08 Pilate, G. R.
'36 Pisano, Rocci G.
'19 Plath, O. E.
'34 Platt, Fred R.
'39 Poff, Marjorie
'41 Potts, R. W. L.
'43 Prince, F. M.
'47 Pritchard, A. E.
'48 Proctor, William
'37 Prole, George
'48 Quate, Larry
'46 Quinnell, Edwin
'38 Rabinovitch, Adolph
'41 Raski, Dewey
'45 Ray, Eugene
'28 Reed, W. D.
'47 Rees, B. E.
'36 Reeves, William C.
'34 Reitzel, Joseph

[19]LOVETT—Notice, P-P.E. 1(1):48. 1924.
[20]NUNENMACHER—Notice, P-P.E. 22(2):70. 1946. Obit. 24(1):1-5, pl. 1948.

'48 Retan, Arthur
'46 Reynolds, Harold T.
'09 Reynolds, L. R.[21]
Ch Ricksecker, L. E.
'48 Rindge, Frederick
Ch RIVERS, J. J. (HonM., '11)
'36 Robinson, Wilbert J. (LM)
'48 Rockwood, L. P.
'48 Roland, John J.
'35 Ross, E. S. (LM)
'49 Ross, Herbert H.
'48 Ruckes, Herbert
'20 Rupe, Louise V. (see Killeen)
'47 Russell, W. A.
'33 Salman, K. A.
'38 Sampson, W. W.
'24 Sanford, Helen N.
'03 Sanford,O. N.
'14 Sargeant, Winthrop
'31 Saylor, Lawrence W.
'49 Schlinger, Evert I.
'35 Schultz, G. W.
'50 Scott, Charles L.
'35 Scott, David B., Jr.
'44 Scullen, H. A.
'47 Seibert, E. E.
'48 Sher, Samuel A.
'29 Simmons, Perez
'38 Simonds, William E.
'49 Simons, John N.
'02 Simpson, H. J.
'49 Sisson, Robert L.
'46 Skinner, Frank
'34 Sloop, Kenneth D.
'35 Smith, Arthur
'48 Smith, Claude I.[2]
'35 Smith, Edgar
'39 Smith, Ernestine I.
'42 Smith, G. F.
'48 Smith, Gordon L.
'24 Smith, Harry
'25 Smith, Ralph H.
'41 Smith, Ray F.
'48 Smyth, E. Graywood
'50 Snelling, Robert
'37 Snyder, Karl D.
'46 Snyder, Karl S.
'50 Spencer, G. J.
'47 Spitzer, C. H.
'25 Spruyt, F. J.
'20 Spuler, Anthony
'38 Stahler, Nathan
'49 Stansbury, R. F.
'45 Steinhaus, E. A.
'27 Steinweden, John B.
'12 Stephens, Frank
'48 Stern, Vernon M.
'10 Sternitzky, R. F.
'35 Stewart, M. A.
'24 Stickney, F. S.
'46 Stojanovich, Chester
'48 Stombler, Victor
'46 Stone. M. W.
'27 Struble, George R.
'21 Tanner, V. M.
'48 Tarshis, I. Barry
'47 Thatcher, T. O.
'49 Thomas, Sherman L.
'04 Thompson, J. H.
'48 Thurman, D. C.
'48 Thurman, Ernestine B.
'39 Tilden, J. W. (LM)
'37 Timberlake, P. H.
'33 Ting, Peter C.
'50 Tinkham. Ernest R.
'08 Topp, Walter
'49 Tucker, K. W.
'49 Underhill, R. A.
'35 Upholt, William (LM)
'27 Usinger, Robert L.
'47 Van den Bosch, R.
'14 VAN DUZEE, E. P. (HonM.,'38)[23]
Ch VAN DYKE, EDWIN C. (HM., '38)
'24 Van Dyke, Mrs. Edwin C.
'37 Vargas, Glenn
'20 Vickery, R. K.
'37 Vogel, Marcel J.

[21]REYNOLDS—Notices, Proc. P.C.E.S. 2(2) :20, 29. 1924.
[2] SMITH—Obit., P-P.E. 26(2) :59-60. 1950.
[23]VAN DUZEE—Notice, P-P.E. 16(3) :123. 1940. Obit., 16(4) :145-177, pl. 1940.

'33 Walker, B. C.
'42 Walker, John R.
'19 Wallace, Grant
'25 Walther, Eric
'35 von Bloeker, J. C., Jr.
'50 Wade, W. H.
'41 Walz, Arthur J.
'48 Waters, Norman D.
'48 Watkins, Stanley
'48 Watson, John M.
'48 Wegenek, E. G.
'10 Wellman, Creighton
'46 Welsh, Hartwell H.
'46 Weitz, Loyal A.
'38 Wheeler, Willis
'36 White, B. E.
'48 White, Raymond G.
Ch Whiting, C. A.
'38 Whitney, Ruth C.
'30 Wilbur, Paul C.
'04 Williams, Francis X.
'25 Wilson, George R.[24]
'48 Wilson, Kent H.
'29 Wind, Robert G.
'03 Winslow, Ross E.
'47 Wirth, W. W.
'01 WOODWORTH, C. W. (HonM., '12)[25]
'03 Wright, Julia
'27 Wright, Percy F.
'27 Wymore, F. H.
'44 Zanette, D. A.
'30 Zimmerman, E. C. (LM)

[24]WILSON—Obit., P-P.E. 14(3):143-144. 1938.
[25]WOODWORTH—Obit., P-P.E. 17(1):30. 1941.

ZOOLOGICAL NOMENCLATURE: NOTICE OF PROPOSED SUSPENSION OF THE RULES IN CERTAIN CASES FOR THE AVOIDANCE OF CONFUSION AND THE VALIDATION OF CURRENT NOMENCLATORIAL PRACTICE

Notice has been received from Secretary Francis Hemming of the International Commission on Zoological Nomenclature that cases involving the following names of insects are now being considered by the Commission. Details of these cases are given in parts 1-4 of volume 2 of the *Bulletin of Zoological Nomenclature* (April 20, 1951) and part 5 of the same volume (May 4, 1951). Interested specialists are urged to send any comments that they wish to make on these cases to the Secretary, 28 Park Village East, Regent's Park, London, N. W. 1, England, as soon as possible and, in any case, not later than the close of the six month period set aside for public discussion of such cases.

If received in sufficient time, comments received in response to the present Notice will be published in the *Bulletin of Zoological Nomenclature;* applications received too late to be so published will be brought to the attention of the International Commission at the time of the commencement of voting on the application in question.

Applications in Part 1

(1) *Aphidius* Nees, 1818 (Class Insecta, Order Hymenoptera) (pp. 18-20) (File 149);
(2) Trivial name *ajax* Linnaeus, 1758 (as published in the combination *Papilio ajax*) (Class Insecta, Order Lepidoptera) (pp. 26-30) (File 192);

Applications in Part 2

(3) *Rantus* Dejean, 1833, (Class Insecta, Order Coleoptera) (pp. 40-45) (File 171);
(4) *Acantholyda* Costa, 1894 (Class Insecta, Order Hymenoptera) and *Acanthocnema* Becker, 1894 (Class Insecta, Order Diptera) (p. 46) (File 175);
(5) *Rhina* Latreille, [1802-1803], and *Magdalis* Germar, 1817 (Class Insecta, Order Coleoptera) (pp. 47-55) (File 202);

Applications in Part 4

(6) *Capsus* Fabricius, 1803 (Class Insecta, Order Hemiptera) (pp. 103-104) (File 211);
(7) *Tettigonia* and *Acrida*: proposed validation as from Linnaeus, 1758 (application submitted under *Opinion* 124) (pp. 106-118) (File 328).

Applications in Part 5

(8) *Titania* Meigen, 1800, and *Chlorops* Meigen, 1803 (Class Insecta, Order Diptera) and associated family names (pp. 134-138) (File 197).
(9) *Dorilas* Meigen, 1800, and *Pipunculus* Latreille, [1802-1803] (Class Insecta, Order Diptera) and associated family names (p. 140) (File 221).
(10) *Tendipes* Meigen, 1800, and *Chironomus* Meigen, 1803 (Class Insecta, Order Diptera) and associated family names (pp. 150-151) (File 469);
(11) *Philia* Meigen, 1800, and *Dilophus* Meigen, 1803 (Class Insecta, Order Diptera) (pp. 153-154) (File 498).
(12) *Tylos* Meigen, 1800, and *Micropeza* Meigen, 1803 (Class Insecta, Order Diptera) and associated family names (pp. 156-159) (File 501).

In addition to applications involving the possible use of the plenary powers, the Parts of the Bulletin contain the following cases relating to the names of insects:

Part 1 (pp. 21-25): question of the availability of the name *Leptopsylla* Rothschild & Jordan, 1911 for the House Mouse Flea (Order Siphonaptera) (File Z.N. (S) 166).
Part 2 (pp. 56-58): Proposed addition of certain names of genera in the Order Collembola to the *Official List of Generic Names in Zoology* (File Z.N. (S) 207).

NEW WESTERN EPHEMEROPTERA II[1]

VELMA KNOX MAYO
Nickel Plate, British Columbia

Ephemerella pelosa Mayo, new species

(figures 6, 7)

Nymph (figs. 6, 7). Dark brown species with yellow markings. No tubercles, but long hairs on head, thorax and abdomen. *Head* yellow with brown vertex and brown stripe along midline the entire length of face. Antennae yellow at base, tinged with light brown distally. Line of hairs on anterior surface of basal segment of antennae. Long, dense fringe of hairs on genae from eyes to mouthparts. No frontal shelf. Hairs also on occiput. Maxillary palp present. *Prothorax* dark brown along posterior margin and medially, antero-lateral angles and two thirds of lateral margin yellow. Long white hairs on either side of midline. Mesonotum dark brown with yellow markings (see fig. 6). Long, fine white hairs on either side of midline on entire thorax. Unsclerotised areas on pleuron and ventral surface smoky. Sclerites yellowish brown. *Legs* yellow with two wide brown stripes on upper surfaces of femora, and along anterior border of tibiae and tarsi. Posterior surfaces of femora washed with brown in basal two thirds. Small spines along posterior borders of fore tibiae and all tarsi. Claws with three small spines. Legs with heavy fringe of hairs on upper surfaces of all segments; note arrangement of hairs on upper surface of all femora (fig. 6). Abdominal tergites very dark brown, tergite 8 yellowish along lateral posterior margins. Instead of bearing tubercles, tergites have paired tufts of hair on posterior margins. They resemble little whisk brooms with about twenty coarse hairs in a tuft. The hairs are longer than the distance between tufts. Tufts are further apart on segments 1-2 (those on 1 covered by wing pads); about equidistant on segments 3-6, closer together on 7-8 and on 9 they are close to midline. Long hairs along entire midline on 10th segment. Traces of light spots above tufts on segments 5-7; laterally on segments 8-9. Lateral posterior border of segment 10 yellow. Tails yellow with one distinct brown band on each, near base; brown spines in whorls at joinings of segments. Tails with long fringe of hairs on anterior surface. Gills present on abdominal segments 3-7. No spines on posterior-lateral angles on tergites. Abdominal sternites yellowish-brown basally, dark brown towards the tail. As in *E. doddsi* Needham, there is an adhesive disc formed of hairs on the ventral surface. The entire sternites 3-8 are covered with long, white hairs (fig. 7). These radiate from a point at the midline on the posterior border of segments 3-7, and those on segment 8 all grow from the anterior border. Length: body 8 mm., tails 8 mm.

[1]Number I of this series appeared in the October, 1939, issue of the Pan-Pacific Ent. 15(4):145-154.

Holotype, nymph (in alcohol), NORTH FORK CREEK above BASS LAKE, FRESNO COUNTY, CALIFORNIA, June 15, 1934. Altitude 3,300 ft. Collected by P. R. Needham and party. Type in the California Academy of Sciences.

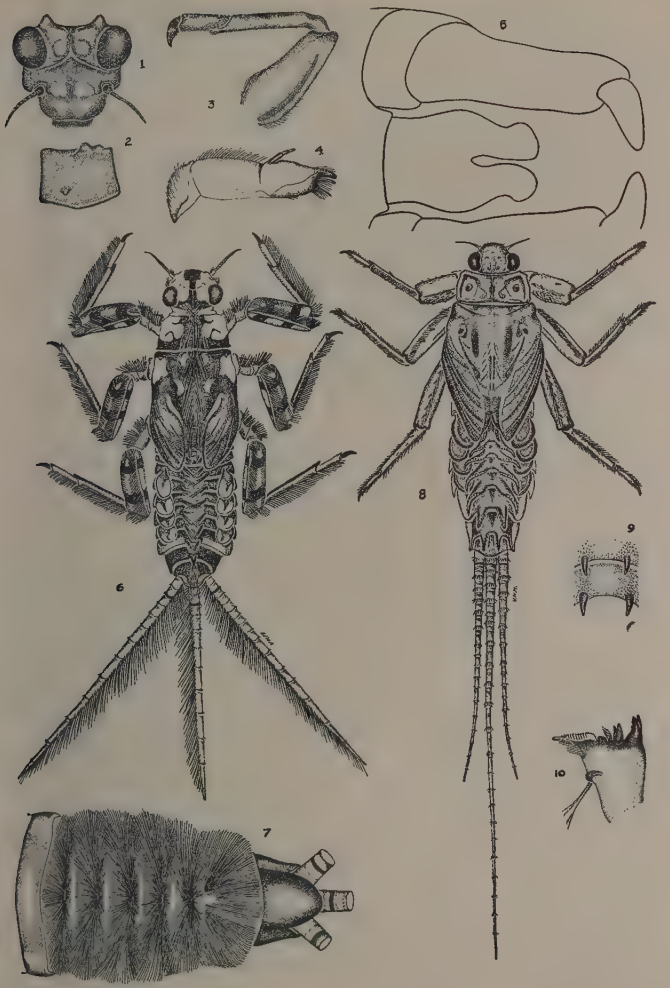
Ephemerella pelosa n. sp. appears to be unique in having hairs and tufts in place of tubercles. It resembles E. *doddsi* in but one characteristic, that of the adhesive disc.

Ephemerella spinosa Mayo, new species

(figure 8)

Nymph (fig. 8). Color dark brown, lighter in immature specimens. Pattern on head and thorax as in figure. No tubercles on head or thorax. Legs yellowish brown. Fore femora with six or eight coarse spicules on posterior margin and upper surface. Middle and hind femora with coarse spicules and fringe of hairs along posterior margin. All tibiae with several spicules medially and at tarsal joinings. Fringe of hairs on fore tibiae and double fringe on middle and hind tibiae. All tarsi with regular row of spines along anterior margin. Claws with 8 or 10 denticles. All joinings dark brown; distal portion of tarsi and claws dark brown. Abdomen conspicuous with prominent spines on tergites 2-9. Those on 2 very close together and straight. Those on 3 farther apart and directed slightly outward. On segments 4-7 they are widely divergent and increase in size to rearward. They are directed both laterally and posteriorly, the tips curved as in fig. 8. Each spine bears a row of coarse spicules from the base on posterior margin, obliquely curving out to the anterior surface of the tip (fig. 8). On segments 8-9 the spines are stout but much shorter and straight, directed but slightly outward, those on 9 shorter than those on 8. The tergites are light brown with dark patches extending from the anterior margins, forming triangles along the midline and dark areas under each gill. All abdominal sternites marked with prominent dark lateral triangles which are connected medially along anterior border. Ganglionic area brown on sternites 1, 6, 7; most prominent on 7. Tails yellowish-brown, each ringed near the base with a dark brown band. Posteriorly each segment of tails with whorl of prominent brown spicules. Outer tails not quite 2/3 length middle tail. Length of body: 7 mm.; of middle tail, 11 mm.

Holotype, nymph (in alcohol), SOUTH FORK BISHOP CREEK, INYO COUNTY, CALIFORNIA, altitude 9,500 ft., July 4, 1938. Collected by the writer. Paratypes, two specimens, one same locality, June 25, 1934; collected by P. R. Needham and party; one Big Pine Creek, altitude 8,100 ft., Inyo County, California, July 2, 1939; collected by the writer. Holotype in the California Academy of Sciences, paratypes in the collection of the writer.



Figs. 1-5, *Ephemerella* species number 1: fig. 1, head of nymph; fig. 2, lateral view pronotum of nymph; fig. 3, foreleg of nymph; fig. 4, maxilla of nymph; fig. 5, male genitalia of subimago. Fig. 6, nymph of *Ephemerella pelosa*. Fig. 7, ventral view of abdomen showing adhesive disc of nymph of *Ephemerella pelosa*. Fig. 8, nymph of *Ephemerella spinosa*. Fig. 9, abdominal tergites 7-8 of nymph of *Ephemerella* species number 1. Fig. 10, mandible of nymph of *Ephemerella* species number 1.

E. *spinosa* n. sp. is a member of the Needhami Group, and is closely related to *E. hystrix* Traver, from Montana. Dr. Needham kindly compared *spinosa* with the type of *E. hystrix* Traver and states that "*spinosa* is relatively broader in form of body, and there appears to be a distinct difference in the form of the dorsal spines of the abdomen. In *E. hystrix* Traver they are straight and nearly smooth." In *spinosa* they are distinctly curved and bear prominent spicules their entire length. Gills darkened in *spinosa*, pale in *hystrix* Traver. In McDunnough's description of *hystrix* Traver (Can. Ent., 67:98) he states that the outer tails are only "slightly shorter than median one, being about 4/5 its length." In *spinosa* the outer tails are less than 2/3 length of median.

Ephemerella species number 1
(figures 1-5, 9, 10)

Male subimago (fig. 5). Abdomen reddish, thorax pale. Anterior margin of pronotum with a V-shaped notch at midline, and posterior margin curved to fit mesoscutum; pale medially, dark brown laterally with a mottled pattern. Mesoscutum creamy with dark brown along lateral sutures and at wing bases. Prescutum dark brown. Pleural sclerites dark brown; unsclerotised areas creamy. Wing veins brown. All femora yellow basally, dark red in apical half. Fore tibiae narrowly yellow along anterior surface, dark red elsewhere. Middle and hind tibiae yellow; all tarsi yellow. Black streak at joinings of tibiae and tarsi, and narrowly black at tarsal joinings. Claws dissimilar. Abdominal tergites with a wide red area along midline which is paler medially, dark red laterally, banded by yellow on either side. Lateral to the yellow bands are red patches; pleural fold is yellow. The abdominal sternites are more uniformly red, with the lateral margins yellow. At the anterior margin of sternites 1-8 are pale oblique streaks, one on either side of midline. Posterior margin of sternite 9 dark reddish brown. Forceps yellowish, penes pale, lyre-shaped. Tails dark red basally, yellow distally, covered with very fine dark hairs. Length: body 11 mm., wing about 14 mm.

Nymph (figs. 1-4, 9, 10). Very dark uniform brown. Tubercles present, but short and blunt. The pronotum with a pair of blunt twin tubercles, the posterior of these much shorter. About midway between these is a wart-like tubercle on either side of midline. Anterior to this group and near lateral margin of pronotum is a sharper tubercle, one on either side. Prosternum with tubercle directed towards head. Ridge along anterior margin of mesonotum but no real tubercles except a slight elevation on scutellum. The mesonotum is roughened and covered with minute dark brown spicules. No teeth on fore femora (fig. 3). Femora brown, tibiae and tarsi yellowish-brown, marked in basal portion of each segment with blackish. Claws dark red with six denticles. Abdominal tergites with

paired spines on segments 2-9. These are wider apart than the length of the spines; on segments 2 and 9 they are slightly closer together than on other segments. All spines practically equal in size, those on 8-9 being but slightly stouter. The spines and tergites sprinkled with minute, dark spicules such as are present on thorax. All tergites evenly colored reddish brown. Gills present on segments 3-7. Tails reddish brown basally, alternating with yellow in outer two thirds. Ventrally the markings of the subimago show through abdominal sternites as two oblique streaks from anterior margin. Laterally is a faint streak on each sternite. Lateral abdominal angles well developed. Length: body, 10 mm.

Male subimago (in alcohol), Cottonwood Creek near Oasis Ranch, California, Mono County line close to California-Nevada boundary, altitude 5,100 ft., June 11, 1939; collected by the writer. Specimens in the collection of the California Academy of Sciences and in that of the writer.

Nymphal material same data; twenty-three specimens.

Ephemerella species number 1 is very closely allied to *E. grandis* Eaton. In the subimago of *E. grandis* Eaton the fore legs are longer than those of *E.* species number 1. The forceps are similar, but the penes are of different shape (see fig. 5). Those of *E. grandis* Eaton more slender, narrower midway between base and tips. In *E.* species number 1 there is a widening on either side, midway between base and tips, suggesting the shape of a lyre.

In the nymphs the prothoracic tubercles of *E. grandis* are slightly larger than those of *E.* species number 1. The wart-like tubercles close to the twin tubercles in *grandis* are laterad; in *E.* species number 1 they are median. The maculation of the abdominal segments is not similar in the two species.

REFERENCES

McDUNNOUGH, J.
1935. Canadian Entomologist, 67 (5) :98.

NEEDHAM, TRAVER, HSU
1935. Biology of Mayflies, Comstock Publishing Co., Ithaca, New York.

Book Notice

Larvae of the Elaterid Beetles of the Tribe Lepturoidini (Coleoptera: Elateridae), by Robert Glen, Division of Entomology, Science Service, Department of Agriculture, Ottawa, Canada, 8vo., paper, 246 pp. Smithsonian Miscellaneous Collections, vol. III, no. II, Smithsonian Publication 3987, April 19, 1950.

This publication was received and read with great interest by the reviewer, who has spent over 30 years studying the economic group of elaterid beetles, the larvae of which are commonly known as wireworms. During the early years of his work with this group the lack of adequate morphological knowledge of both the larval and adult stages of these agricultural pests was a serious handicap in differentiating related species. The reviewer has spent many years trying to straighten out the adult taxonomy. Since many of our wireworms of economic importance take several years to complete their life cycle, it is essential that species be known in the larval stage, without a long process of rearing. This volume by Dr. Glen is not only a fine contribution to the science of taxonomic entomology, but it is also a valuable aid to the economic field.

Dr. Glen has recently been appointed Chief of the Division of Entomology, Science Service, Ottawa, but he initiated this work on the morphology of the larval stage of wireworms in 1929, under the direction of Dr. K. M. King, who was then in charge of the Dominion Entomological Laboratory at Saskatoon, Saskatchewan.

Dr. Glen's earlier works on the detailed larval description of individual species have been very helpful to others studying wireworms, but in this larger work he now brings together all the information found in the literature of the world on the larvae of the tribe Lepturoidini, including many of economic importance. Altogether he treats of 93 species, included in the following 11 genera: *Athous* (14); *Crepidomenus* (1); *Cryptohypnus* (5); *Eanus* (2); *Elathous* (1); *Hemicrepidius* (5); *Hypnoidus* (3); *Lepturoides* (3); *Limonius* (14); *Ludius* (44), and *Melanactes* (1).

Since his investigations were discontinued in 1942, some of the recent changes in nomenclature of the Elateridae have not been included. The tribe Lepturoidini should now be called the Denticollini, and the genera would be changed as follows: *Cryptohypnus* to *Hypolithus; Hypnoidus* to *Negastrius; Lepturoides* to *Denticollis*, and *Ludius* to *Ctenicera*.

There is a fine summary of literature on the subject from 1855, including such names as Schiodte (1870); Comstock and Slingerland (1891); Forbes (1892); Hendriksen (1911); Hyslop (1917); Hyslop and Boving (1935), and Lanchester (1939). He follows the terminology of Hyslop, Boving, Snodgrass and Anderson, as well as others.

The prairie grain wireworm (*Ctenicera destructor* Brown) has been used as a typical larva of the group and described in detail. On page 33 there is a key to the larvae of the subfamilies of the Elateridae and to the tribes of the subfamily Pyrophorinae. This is

followed by keys to genera, isolated "species groups" and isolated species of the tribe Denticollini (Lepturoidini). The various "isolated" groups and species of each genus are taken next, with keys, descriptions, distribution, and source of material given under each. There is a summary of taxonomic relationships with list of species studied as an index on pages 197, 198. Literature cited runs to 8 pages, which is a most complete bibliography of the principal literature on elaterid larval morphology, as well as some on biology and adult taxonomy. There are 40 pages of drawings, all by the author.

The section on the genus *Limonius* is somewhat confused, but this can be charged mainly to lack of material and published information regarding adults. The reviewer has revised the adult taxonomy, at least of the economic forms, although it is still unpublished.

Lanchester in 1946 published the identifying characters separating six of the economic species, four western and two eastern. The larvae of *Limonius anceps* LeConte and *L. ectypus* Say are still unknown. The species in Dr. Glen's key, page 164, called *L. subauratus* LeConte is really *L. infuscatus* Motschulsky and the species near *L. ectypus* Say from Manitoba, Saskatchewan, and Alberta is probably *L. californicus* Mannerheim, as this species is known from various places in Montana by adults and larvae.

Only one who has worked a long time with wireworms, both systematically and biologically, can appreciate the vast amount of effort that went into the preparation of Dr. Glen's work. We hope it will form a basis for future works in this and related groups, and that it will inspire other workers to add to our knowledge of wireworms over the world. One of the great needs is more students of larval taxonomy with the ability and patience, shown by Dr. Glen, to help the economic entomologist determine the species with which he works.—MERTON C. LANE, Walla Walla, Washington.

HETERLIMNIUS KOEBELEI IN OREGON

(Coleoptera: Elmidae)

Collecting in the Little Applegate River area, Jackson Co., Oregon, 10 miles from California, on August 5-6, 1950, Mr. Vernon E. Thatcher of Oregon State College and I took 18 specimens of *Heterlimnius koebelei* Martin, over 80 specimens of *H. quadrimaculatus* Horn, and numerous larvae of both species. *H. koebelei* was known previously from Washington and the new record represents a southward extension of the range. The beetles were in a tiny, rapidly flowing mountain stream at 2300 feet altitude and were clinging under stones and in crevices. I am indebted to Dr. M. W. Sanderson for the identifications.—BORYS MALKIN.

FOUR NEW FLEAS OF THE GENUS DACTYLOPSYLLA JORDAN, 1929

(Siphonaptera)

FRANK M. PRINCE AND HAROLD E. STARK[1]

Communicable Disease Center, Public Health Service, Federal Security Agency, Atlanta, Ga.

Among fleas sent in by field units of the Western Communicable Disease Center Laboratory, two new species and one new subspecies of *Dactylopsylla* Jordan 1929 were noted and are herein described. A third species being described is from collections obtained by the junior author while gathering material for a master's thesis on Utah fleas.

Dactylopsylla bluei psilos Prince and Stark, new subspecies

This subspecies (figs. 1-5) is closely related to *D. bluei bluei* (C. Fox, 1909), but as the name indicates it is armed with fewer bristles.

Head: Clypeal tubercle absent as in *D. b. bluei.* Antenna reaches beyond posterior border of head in male but does not in female. Scape in both sexes without setae. Pedicel of male without setae; pedicel of female with 8 setae reaching beyond end of clava. Clava of male definitely segmented but segmentation of clava of female not pronounced. Double row of small setae above antenna of male; single row in female. Two rows of medium and large setae on gena and one row on posterior border of head. Mouth parts short, labial palps extend only two-thirds length of fore coxa.

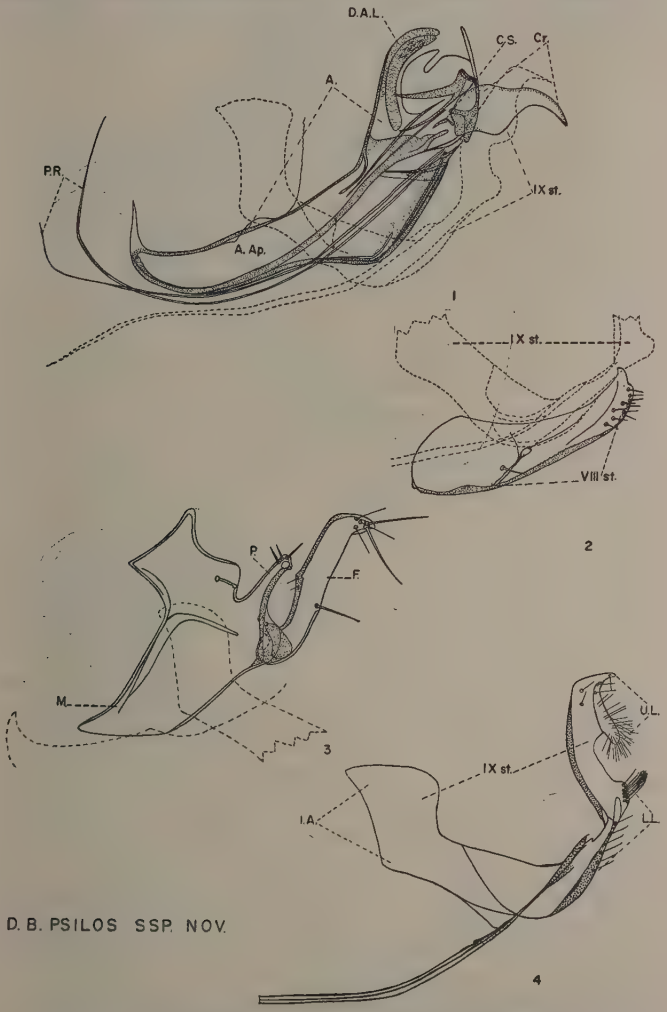
Thorax: Pronotal ctenidium with 19 or 20 teeth. Meso- and metathorax not heavily covered with setae. Posterior dorsal row of setae on mesonotum (both sexes) consists of from 5 to 7 setae on each side, while other species of *Dactylopsylla* have 8 to 12 setae. Posterior dorsal row of setae on metanotum consists of from 7 to 9 setae on each side while all other species except *D. b. bluei* and *D. digitenua* have more. This row on *D. b. bluei* specimens numbers from 8 to 10 setae. The number of long, stout, dorsal bristles on the hind tibia ranges from 17 to 22. The medial displacement of the first pair of plantar bristles of segment V of tarsae is not pronounced.

Abdomen: Over-all chaetotaxy on abdomen is similar to other species of *Dactylopsylla* except for being sparse. The average number of setae in each posterior row on abdominal tergites is 12 on

[1]From Western Communicable Disease Center Laboratory, San Francisco, Calif.

each side; in other species 14; though in *D. b. bluei* up to 16 on each side. Antepygidial bristles: one with one small seta in male; three in female.

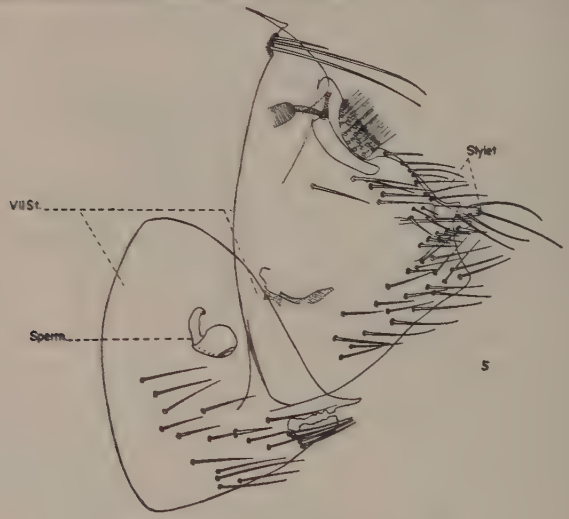
Modified segments. Male: The VIII tergum is large, covering most of the external genitalia. The VIII sternum is reduced and



(All figures are in lateral view, left side)

Figs. 1-4, *Dactylopsylla bluei psilos.* 1, aedeagus; 2, VIII sternum; 3, manubrium, clasper, finger; 4, IX sternum.

unmodified, having no posterior process and no diagnostic setae except 10 or so extremely small setae. The IX tergum reduced as a whole, manubrium being shorter than in *D. b. bluei*. Clasper is



D.B. PSILOS SSP. NOV.

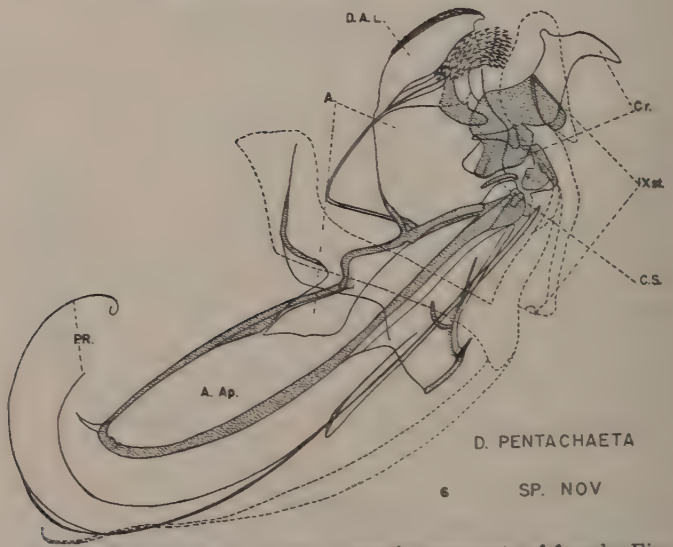


Fig. 5, *Dactylopsylla b. psilos*, posterior segments of female. Fig. 6, *D. pentachaeta*, aedeagus.

small, with a prominent, narrow, dorsal process. Finger long and narrow as in *D. b. bluei* but the distal end is not turned as far posteriorly. The internal arms of the IX sternum are large as in *D. b. bluei.* The median lobe bears many small, fine setae. The upper lobe is relatively larger than in *D. b. bluei* and is heavily covered with thin setae. The dorsal process of the upper lobe is broader and the ventral process is smaller than in *D. b. bluei.* The aedeagus is similar in shape to *D. b. bluei,* but the distal ends of the crochets are small and directed posteriorly.

Female: The posterior border of the VII sternum shows a small, prominent, sharply pointed lower lobe which marks the junction of the ventral border and the posterior border. The only available female (allotype) has a broken section in the lobe giving the appearance of two lobes as shown in the drawing. This female has a collapsed spermatheca. The tail is well differentiated from the head and bears a very prominent appendage. The head is probably an oval subglobular shape. The stylet terminates in a medium-sized bristle (seta) and has two ventral setae.

Measurements (lengths): Holotype male, 2.8 mm. Allotype female, 3.9 mm. Paratype males, 3.3 mm.; 3.3 mm.; 3.2 mm.; 3.1 mm.; 2.9 mm.; 2.8 mm.; 2.8 mm. Average, 3.1 mm. for males.

Type host: *Thomomys perpullidus* subsp.

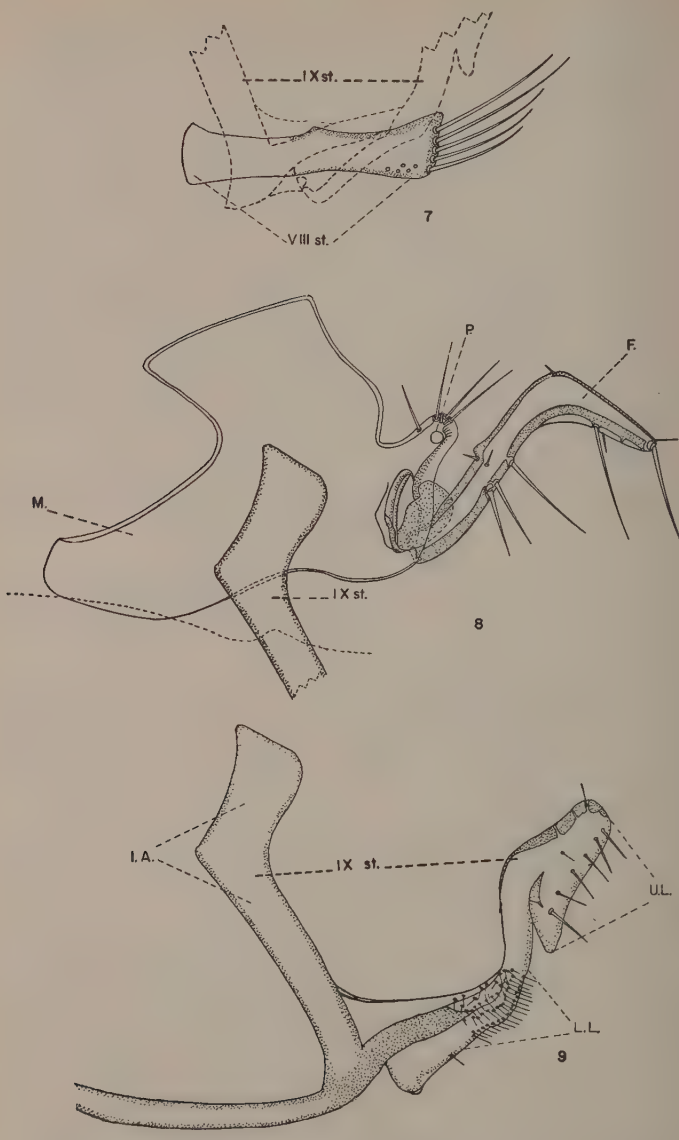
Type locality: 20 mi. W. LAS VEGAS, STATE GAME REFUGE, 2300 ft., CLARK CO., NEVADA. Ecological association: greasewood, cacti. Collected by Mr. Huey Owen and Mr. Orris Smith, March 26, 1949.

Holotype male and allotype female on deposit at Western Communicable Disease Center Laboratory. Paratype males: one at U. S. National Museum, Washington, D. C., and one at British Museum (Natural History), in Siphonaptera collection at Tring, Herts, England.

Dactlyopsylla pentachaeta Prince and Stark, new species

This species (figs. 6-10) is closely related to *D. percernis* Eads and Menzies, 1949 and *D. neomexicana* Prince, 1945.

Head: Clypeal tubercle absent. A notch is present but barely discernible in both sexes. Antennae extend to posterior border of head in the male but not in the female. Scape with 5 very small setae. Three extremely tiny setae on pedicel of male; 7 or 8 setae on pedicel of female reaching to end of the clava. The clava has 9 distinct segments. These characters differ from those of *D. percernis* in that the pedicel of the male *D. percernis* has 6 distinct but thin setae reaching half the length of the clava, and the female of both *D. percernic* and *D. neomexicana* has 7 or 8 setae on the pedicel reaching beyond the clava. The male of *D. neomexicana* has 7 or 8 extremely tiny setae similar to *D. pentachaeta.* Vertex of cranium (male only) and borders of gena heavily chitinized. Two distinct rows of large-sized bristles on gena (5 or 6 bristles in each row)



D. PENTACHAETA SP. NOV.

Figs. 7-9, *Dactylopsylla pentachaeta*. 7, VIII sternum; 8, manubrium, clasper and finger; 9, IX sternum.

and one row on posterior border of head. Small setae above antennae begin as two rows anteriorly and grade into four irregular rows posteriorly. Mouth parts short; labial palps extend only two-thirds length of fore coxa.

Thorax: Pronotal ctenidium with 21 teeth in both sexes. Meso- and metathorax as in other members of genus. Hind tibia has 22 long, stout, dorsal bristles. First pair of plantar bristles of segment V of tarsae are turned downward and inward.

Abdomen: Over-all chaetotaxy as in other members of genus. Antepygidial bristles 3 in male, 4 in female.

Modified segments. Male: The VIII tergum is large and covers most of the external genitalia. The VIII sternum is very distinct. It has virtually no posterior process but terminates broadly with 5 large, distinct setae. The VIII sternum of *D. neomexicana* bears 3 or 4 large, distinct setae and has a small posterior process which is slightly more pronounced than in *D. pentachaeta*. *D. percernis* has 4 smaller bristles, and the outline of the VIII sternum is quite unlike that of *D. pentachaeta*. The IX tergum is distinct and well inside the body cavity. The clasper is small, with narrow prominent dorsal process. The finger is large. The distal one-third of the finger is extended posteriorly from a 90° angle. The anterior border of the finger has a small but prominent protrusion in the middle. This process is not present in either *D. neomexicana* or *D. percernis*. There are 3 medium-sized bristles along the posterior border, 2 placed close together. This is similar to *D. neomexicana*, but *D. percernis* has only 2 medium-sized bristles along the posterior border. The internal arms of the IX sternum are prominent. Externally the median lobe bears many small setae on the posterior and lateral parts. The upper lobe is quite prominent, bearing many thin setae.

Female: Posterior border VII sternum with distinct sinus. This sinus is not prominent in either *D. percernis* or *D. neomexicana*. Spermatheca without demarcation between head and tail. Process at tip of tail. Head not as heavily pigmented as *D. percernis* or *D. neomexicana*. Stylet terminates with medium-sized bristle and has two ventral bristles, one small lateral bristle and two exceedingly tiny dorsal bristles. *D. percernis* and *D. neomexicana* have the two ventral bristles but no small lateral bristle.

Measurements (lengths): Holotype male, 3.2 mm. Allotype female, 3.6 mm. Paratype females, 3.6 mm. and 3.2 mm.

Type host: *Mustela* sp.

Type locality: LOUICH RANCH, 20 mi N., 5 mi. E. BENKELMAN, 3,200 ft., DUNDY CO., NEBRASKA. Ecological association: rolling sand hills, grass, *Cynomys* sp. present. Collected by Mr. Huey Owen and Mr. Dwight Campau, June 12, 1945.

Holotype male and allotype female on deposit at Western Communicable Disease Center Laboratory. One paratype female at U. S. National Museum, one at British Museum (Natural History).

Dactylopsylla digitenua Prince and Stark, new species

This species (figs. 16-19) is close related to *D. pentachaeta* but is separated readily on the modified segments, particularly the finger of the clasper and the crochet. Only one male is known to us.

Head: Clypeal tubercle as in *D. pentachaeta;* a notch discernible. Antennae extend slightly beyond posterior border of head. Scape with 5 very small setae. Six extremely thin setae on pedicel reach only to the first segment of the clava which has 9 distinct segments. The small setae above antennae grade into three irregular rows instead of four. Chaetotaxy of head otherwise as in *D. pentachaeta.*

Thorax has fewer setae than *D. pentachaeta.* The anterior dorsal rows of setae on the meso- and metanotum number about 10, and the posterior dorsal rows number 8 in *D. digitenua,* while in *D. pentachaeta* the anterior dorsal rows number 15 and the posterior dorsal rows number 11 setae on each side. The hind tibia has 18 long, stout, dorsal bristles. Plantar bristles of segment V as in *D. pentachaeta.* Pregenital segments of abdomen as in *D. pentachaeta.*

Modified segments. Male: The VIII sternum has no posterior process, differing from *D. pentachaeta* which has a very inconspicuous process dorsal to the five bristles. There are 5 setae on the left side of the VIII sternum as in *D. pentachaeta,* and 4 setae on the right side as in *D. percernis.* The dorsal process of the clasper is similar to that of *D. pentachaeta.* The finger of the clasper is much more slender than in *D. pentachaeta.* The placement of the bristles on the finger is identical. The lower lobe of the IX sternum is a little more broadly curved, and the upper lobe is very thin and elongated while that of *D. pentachaeta* is quite broad and bears many thin setae. In this respect it resembles *D. percernis* and *D. neomexicana.* The crochet is quite different from that of *D. pentachaeta* and *D. percernis.* Instead of being more or less rounded and produced posteriorly, it has one dorsal and one posterior, prominent, narrow process, as in *D. neomexicana.*

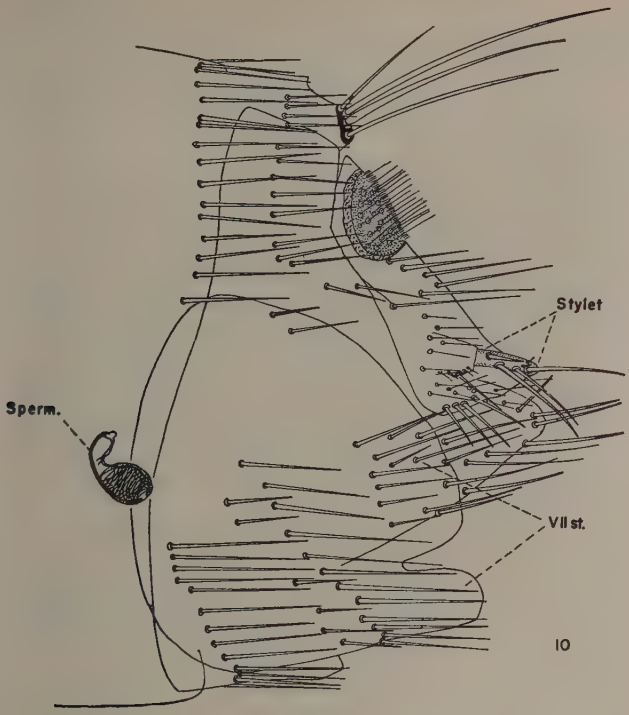
Dactylopsylla digitenua is closest to *D. pentachaeta,* but since it has some characteristics similar to *D. neomexicana* and *D. percernis,* these four fleas are probably subspecies of one another. However, until more specimens are obtained for comparison, the present nomenclature is maintained.

Measurements (length): Holotype male, 3.3 mm.

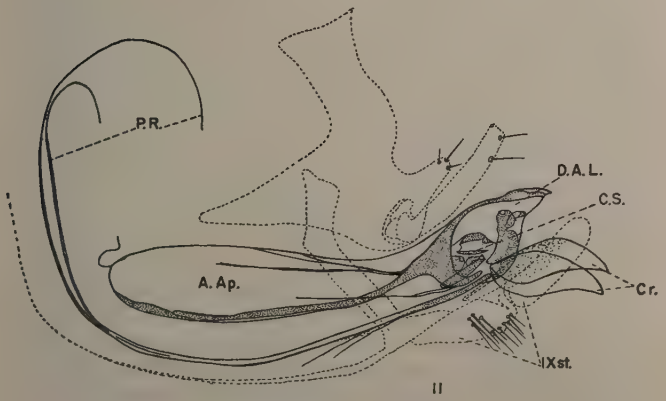
Type host: *Onychomys leucogaster ssp.* (true host probably *Geomys* sp.).

Type locality: 10 mi. W. Matador, 2,400 ft.; Motley County, Texas. Ecological association: small streamside, mesquite, sage,

Fig. 10. *Dactylopsylla pentachaeta,* female. Fig. 11, *D. minidoka,* aedeagus.



D. PENTACHAETA SP. NOV.



D. MINIDOKA SP. NOV.

Geomys breviceps ssp. present. Collected by Mr. Frank Terry and Mr. Reino E. Raikko on May 3, 1950.

Holotype male on deposit at Western Communicable Disease Center Laboratory.

Dactylopsylla minidoka Prince and Stark, new species

This species (figs. 11-15) is closely related to *D. nuditenacula* Prince, 1945.

Head: Clypeal tubercle exceedingly small, more so than *D. nuditenacula.* Antennae of male extend little beyond posterior border of head. Scape large in male, without bristles in either sex. Pedicel of male with 6 setae reaching halfway along clava. Pedicel of female with 7 setae reaching beyond end of clava. Antennae of female do not reach posterior border of head. Single row in male, double row in female, of small setae above antenna. Two rows of thin medium-length setae on gena and one row of setae on posterior border of head. Only 4 bristles to each row on gena at most. Labial palps extend three-fourths the length of the fore coxa.

Thorax: Pronotal ctenidium with 23 teeth. Meso- and metathorax as in other members of genus.

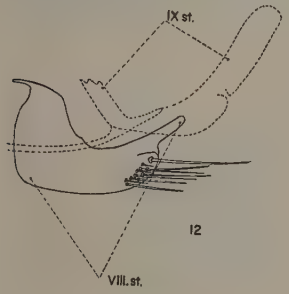
Abdomen: Over-all chaetotaxy similar to other members of genus. Antepygidial bristles 2 in male, with 1 small seta; 3 or 4 in female. Hind tibia has about 16 long, stout, dorsal bristles. All plantar bristles of segment V of tarsae are placed laterally.

Modified segments. Male: VIII tergum quite large, covering the greater part of the external genitalia. The VIII sternum is distinctive. The distal part is small and bears many bristles along the posterior ventral border. There is a long, narrow, distal process, having a rounded end and bearing no setae. The appearance of the VIII sternum is quite like that of *D. nuditenacula.* The IX tergum is small but distinctive. The manubrium is triangular in shape. The clasper is small and the dorsal process has a broad base, is not very long, and terminates with three small setae. The long, straight, narrow finger is quite similar to that of *D. nuditenacula* except that it bears 4 or 5 small setae laterally and along the posterior border. The internal arms of the IX sternum are narrow and smaller than in *D. nuditenacula.* The median lobe has an expanded posterior border (unlike *D. nuditenacula*) and bears several lateral setae. The upper lobe is large, bearing many thin setae and is similar to that of *D. nuditenacula.*

Female: The general outline of the posterior border of the VII sternum is similar to that of *D. nuditenacula* except that the lowest lobe is more pronounced, having an acute angle of 88 degrees, compared to 114 degrees for *D. nuditenacula.* The spermatheca and stylet are as in *D. nuditenacula.*

Measurements (lengths): Holotype male, 4.1 mm. Allotype fe-

male, 4.2 mm. Paratype males, 4.4 mm.; 4.1 mm.; 4.0 mm.; 3.9 mm.; average, 4.1 mm. Paratype females, 4.8 mm.; 4.8 mm.; 4.4 mm.; 4.3 mm.; 4.2 mm.; average, 4.5 mm.



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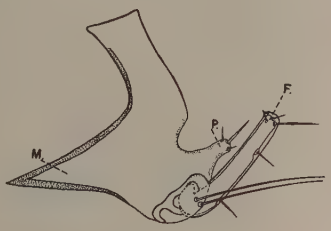

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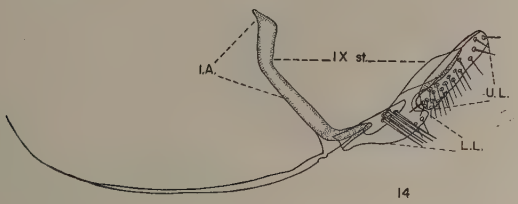

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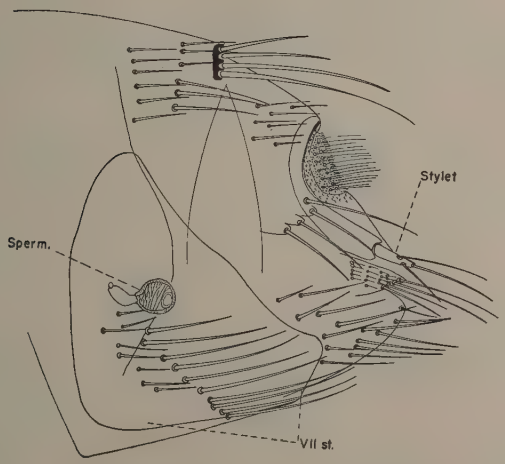

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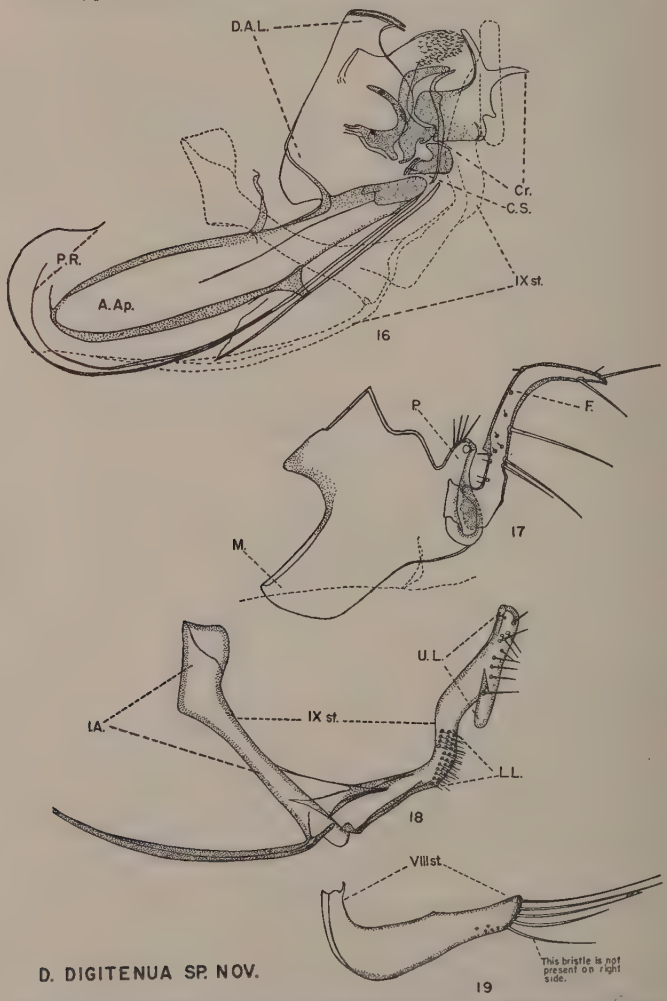
D. MINIDOKA SP. NOV.

Figs. 12-15, *Dactylopsylla minidoka*. 12, VIII sternum; 13, manubrium, clasper and finger; 14, IX sternum; 15, female.

Type host: *Thomomys talpoides gracilis* (Durrant, 1939).

Type locality: Minidoka National Forest, 7½ mi. S. E. Yost, on George Creek, 6,500 ft., Raft River Mts., Box Elder Co., Utah. Collected by Dr. Keith R. Kelson, May 11, 1947.

Holotype male and allotype female on deposit at U. S. National



Figs. 16-19, *Dactylopsylla digitenua*. 16, aedeagus; 17, manubrium, clasper, finger; 18, IX sternum; 19, VIII sternum.

Museum. Paratype males and females at University of Utah Entomological Museum, Salt Lake City, Utah; at the Western Communicable Disease Center Laboratory; and at the British Museum (Natural History).

ABBREVIATIONS OF LETTERING ON FIGURES

A.	Aedeagus
A. Ap.	Aedeagal apodeme
Cr.	Crochet or aedeagal hook
C. S.	Crescent sclerite
D. A. L.	Dorsal apical lobe of aedeagus
F.	Finger of clasper lobe
I. A.	Internal arm of IX sternum
L. L.	Lower lobe of IX sternum
M.	Manubrium
P.	Dorsal process of clasper lobe
P. R.	Penis rods
Sperm.	Spermatheca or receptaculum seminis
St.	Sternum (of abdominal segment)
U. L.	Upper lobe of IX sternum

SELECTED BIBLIOGRAPHY

EADS, R. H. AND G. C. MENZIES
1949. A new flea from the pocket gopher. Journal of Parasitology 35 (2):171-174, Illus. Lancaster, Pennsylvania.

FOX, C.
1909. A new species of *Dolichopsyllus*—A genus of the Siphonaptera. Entomological News 20 (5):195-196, figures 1-4. Philadelphia, Pennsylvania.

JORDAN, K.
1929. Notes on North American fleas. Novitates Zoologicae 35 (1):37-38, figure 26. Tring, England.

JORDAN, K.
1933. A survey of the classification of the American species of *Ceratophyllus* s. lat. Novitates Zoologicae 39 (1):75. Tring, England.

PRINCE, F. M.
1945. Descriptions of three new species of *Dactylopsylla* Jordan and one new subspecies of *Foxella* Wagner, with records of other species in the genera (*Siphonaptera*). Canadian Entomologist 77 (1):15-20, figures 1-7. Guelph, Canada.

SEAL CONTEST

The contest for an official seal for the Pacific Coast Entomological Society, announced in our January issue, was won by Mrs. L. R. Gillogly, Sacramento, California.

THE CADDISFLY GENUS ANAGAPETUS

(Trichoptera: Rhyacophilidae)

HERBERT H. ROSS

Illinois Natural History Survey, Urbana, Illinois

At the time of its original description, *Anagapetus* Ross was considered a subgenus of *Agapetus* chiefly because it lacked any of the specialized male secondary sexual characters which typify most groups of *Glossosoma,* its only other relative. More recently I have been fortunate in obtaining larvae and pupae of *Anagapetus,* and these stages, together with a more detailed study of the adults, have shed considerable light on the phylogeny of the entire complex.

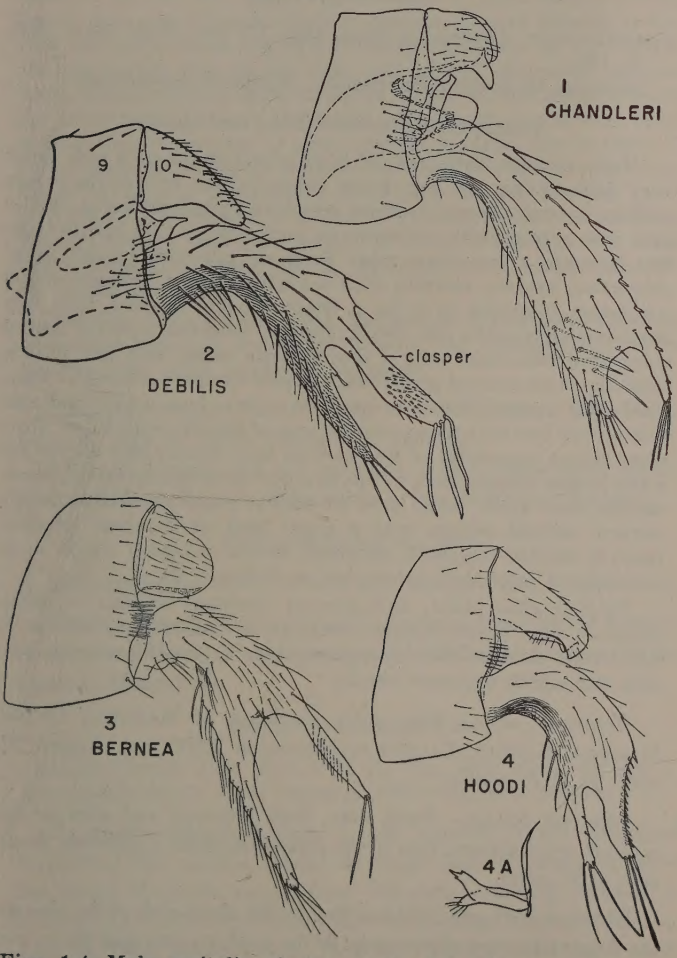
The larva of *Anagapetus* is virtually indistinguishable from that of *Agapetus,* the front leg being attached near the midpoint of the lateral margin of the pronotum. The pupa is more or less intermediate between *Agapetus* and *Glossosoma,* the mandibles having one of the preapical teeth a little more prominent than the other, in this way suggestive of *Glossosoma.* The adult lacks completely the specialized conditions which mark both *Agapetus* and *Glossosoma;* the hind wing has a full complement of veins, as in *Glossosoma,* and in this respect differs from the reduced venation typical of *Agapetus;* the front wing lacks the callosity and realignment of veins typical of *Glossosoma;* the legs have simple tibial spurs and the abdomen of the male has the lateral plate on the fifth segment only slightly developed in contrast with the highly specialized condition found in *Agapetus.* The adult of *Anagapetus* has only a single transverse wart on the mesoscutellum; both *Agapetus* and *Glossosoma* have a pair of small warts on this sclerite.

From this it would seem that *Anagapetus* is the most generalized group of the complex and represents the known existing form closest to the common ancestor of both *Agapetus* and *Glossosoma. Glossosoma* apparently diverged in one direction, developing distinctive characteristics especially in the larva and in the male, and *Agapetus* diverged in another direction, developing distinctive wing characters in the adult with little change in the larva or pupa.

It would seem from this that *Anagapetus* is an archaic remnant of an old phyletic stem. It is represented by only four known species distributed locally through the western montane region of North

America, from California to southern British Columbia. These four species are very closely related which would indicate that only one small branch of the genus has yet been unearthed, and that other branches are either extinct, rare, or occur in regions of the world which have not yet been well collected.

It is interesting that *Glossosoma* has developed into the dominant



Figs. 1-4. Male genitalia of *Anagapetus*, lateral aspect; fig. 4A, posterior aspect of mesal process at base of clasper.

saddle-case maker of the cold and rapid streams, especially abundant in mountainous areas. *Agapetus*, on the other hand, has moved towards warmer streams and is found most abundantly in the brooks of rolling and less mountainous terrains. In contrast, *Anagapetus* is relatively uncommon, and is known only from the slower small streams and brooks in the western mountains.

ANAGAPETUS Ross

Agapetus subg. *Anagapetus* Ross, 1938, Ill. Nat. Hist. Surv. Bull. 21:109.

Genotype by original designation: *Agapetus debilis* Ross.

Anagapetus chandleri Ross, new species

Male—Length from front of head to end of wings, 5 mm. Color very dark brown, the legs below coxae lighter brown, the wings uniformly smoky brown. General structure typical for genus. Abdomen with a triangular projection on each side of fifth sternite, the two joined by a transverse ridge. Sixth sternite with a small mesal projection, seventh sternite with a slightly larger truncate mesal projection. Genitalia as in fig. 1. Ninth segment annular, with only scattered hairs on the side. Tenth tergite divided into a pair of lateral sclerotized lobes each with a membranous mesal area and with a toothlike ventrolateral projection. Clasper elongate, curved at base, incised for about a fifth of its length at apex to form a narrow dorsal and a wide ventral process; dorsal edge of clasper with a few short stout spines, remainder of clasper with long slender hair except for a few longer, stouter setae at tips of apical processes and along inner margin near apex; mesal area at base of clasper produced into a narrow vertical sclerite with a slight hook at its apex. Between these is exerted the small, elliptical, simple aedeagus which bears internally a sclerotized thickening as shown in fig. 1.

Female—Size, color, and general structure similar to male. Abdomen with paired lateral swellings on the fifth sternite as in male, sixth sternite with a large truncate apicomesal process, seventh and eighth segments simple.

Holotype, male.—Two miles southeast of MARIPOSA GROVE, MARIPOSA COUNTY, CALIFORNIA, elevation 7,000 feet, August 27, 1946, H. P. Chandler.

Allotype, female.—Same data. Both holotype and allotype deposited on permanent loan in the collection of the California Academy of Sciences.

This species is readily identified by the short cleft of the clasper, the finger-like ventral processes of the tenth tergite, and the row of widely separated short spines on the dorsal margin of the clasper.

Anagapetus hoodi Ross, new species

Male—Length from front of head to tip of folded wings, 6 mm. Color very dark brown, in life appearing black, with the legs below coxae yellowish-brown. General structure typical for genus. Fifth, sixth, and seventh segments with structures and processes as described for *chandleri*. Genitalia as in fig. 4. Ninth segment annular, its posterior margin with a lateral comb of clavate setae between bases of clasper and tenth tergite. Lobes of tenth tergite a little longer than dorsal length of ninth segment, concave beneath so that each lobe has a mesal and lateral ventral angulation at tip. Clasper sharply curved just beyond base, and beyond this point enlarged into a wide, mesally concave structure incised at apex approximately one-third its total length; the dorsal process so formed is wide, bears usually three long setae at apex, and has a dorsal row of about 15 short, sharp spines which arise on the mesal side and project above the dorsal edge of the profile; ventral arm slender, bearing 3 or 4 long setae at tip. At base of clasper is a narrow mesal process which projects dorsad; this is not angled at tip as in *chandleri* but bears two or three short spurs, fig. 4A. Aedeagus short, ovoid, very similar to that of *chandleri*.

Female—Length 7 mm., color and general structure as for male. Abdominal segments simple and tubular, and indistinguishable externally from other species in the genus.

Holotype, male.—NORTH FORK of IRON CREEK, MT. HOOD, OREGON, July 30, 1948, Kenneth M. Fender.

Allotype, female, and one paratype, male.—Same data. All deposited in the collection of the Illinois Natural History Survey.

ANAGAPETUS BERNEA Ross

Anagapetus bernea Ross, 1947. Trans. Am. Ent. Soc. 73:131. ♂, ♀.

To date this species is known only from Hood River County, Oregon, and Berne, Washington, both localities in the heart of the Cascade Mountains.

ANAGAPETUS DEBILIS Ross

Agapetus debilis Ross, 1938. Bull. Ill. Nat. Hist. Surv. 21:108. ♂.
Anagapetus debilis Ross. Denning, 1949. Can. Ent. 80:113. ♀.

Originally described from Logan Canyon, Utah, additional records of this species extend its range through many areas of the Rocky Mountain ranges from Colorado to eastern Oregon, as follows: COLORADO—Green Mt. Falls: July 12, 1938, larvae; June 14, 1938, pupae, larvae; June 23, 1938, larvae; June 4, 1938, stream No. 1, pupae. West Creek: July 5, 1938, larvae, pupae.

Rocky Mountain National Park: Chiquita Creek, July 27, 1938, 3♀. UTAH—Beaver, June 26, 1942; Logan Canyon, Spring Hollow: July 17, 1938, ♂, ♀; July 21, 1938, ♂; Timpooneke Guard Station, Wasaben National Forest: Aug. 26, 1943, ♂, ♀; Maple Canyon, June 1, 1939, ♂. WYOMING—Fox Park: July 4, 1938, ♂, ♀; Wilson: Aug. 12, 1940, Coal Creek, ♂, ♀; Yellowstone National Park: Dunraven Pass, Mt. Washburn, Aug. 2, 1940, ♂; Specimen Creek, Station 5, Aug. 6, 1947, 6♂♀. OREGON—Durkee: Powell Creek, June 13, 1947, 5♂♀. MONTANA—Glacier National Park, Sprague Creek, July 11, 1940, ♂♂, ♀♀.

In each place in which I have collected this species it has occurred in a brook-type of stream rather than a more rapid cascading mountain creek. In no case have I taken them in the same stream with *Glossosoma;* the mountain species of this latter genus occur in the larger and more rapid streams.

Key to Species—Males

1. Apex of clasper only shallowly incised, lower margin not forming a slender finger; each lobe of tenth tergite with a thumblike lateral projection; fig. 1 ..... *chandleri*
   Apex of clasper with a deep incision forming an upper and a lower finger-like process; tenth tergite at most with angulate corners, never with thumblike projections; figs. 2-4 2

2. Lateral lobes of tenth tergite short and deep, fig. 3; baso-mesal process of clasper extending backward so that it is almost indistinguishable from lateral view ..... *bernea*
   Lateral lobes of tenth tergite longer than deep; baso-mesal process of clasper extending almost directly dorsad and easily seen from lateral view, figs. 2, 4 3

3. Dorsal arm at apex of clasper with a mesal cluster of fairly long setae, fig. 2 ..... *debilis*
   Dorsal arm at apex of clasper with a mesal row of short spines along dorsal edge, and projecting above it, fig. 4 ..... *hoodi*